

DISSERTATION

EXAMINING THE MATURE INTERPERSONAL RELATIONSHIP STATUS OF FIRST-
YEAR ENGINEERING STUDENTS WITHIN RESIDENTIAL LEARNING COMMUNITIES

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ABSTRACT

EXAMINING THE MATURE INTERPERSONAL RELATIONSHIP STATUS OF FIRST-YEAR ENGINEERING STUDENTS WITHIN RESIDENTIAL LEARNING COMMUNITIES

The purpose of this mixed-methods, sequential, explanatory study was to investigate the differences regarding the status of mature-interpersonal-relationship (MIR) development in first-year engineering students who elected to live within residential learning communities (RLCs) when compared to the status of MIR development in those first-year engineering students who lived within a traditional residential environment at a science, technology, engineering, and math (STEM) institution. A survey of 582 first-year engineering students at a STEM institution yielded quantitative results. Then, to explore the initial results in more depth, a follow-up study using two separate focus groups was completed with purposefully selected respondents. The follow-up qualitative phase attempted to provide logical connections to the findings from the original quantitative phase, which showed that students who live within RLCs have experiences that provide those students with opportunities for MIRs. In the quantitative phase, statistically significant results were limited to a difference by gender. The quantitative and qualitative findings from the two phases of the study are discussed, with reference to prior research. Implications and recommendations are provided.

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“If I have seen further it is by standing on the shoulders of giants.” —Sir Isaac Newton

Many years ago, I told myself that, despite my early academic record, I did possess the competencies, drive, and abilities needed to attain a college degree. Moving on to obtaining a master’s degree and then completing a PhD degree is the fulfillment of a goal that I knew I had the potential for; I only needed the encouragement and chance to grow.

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CHAPTER 1: INTRODUCTION

Student learning is a constant and continuous process. A growing body of research continues to evolve and suggest that students develop both inside and outside of the classroom. Therefore, institutions continue to create and modify conditions for learning while adjusting to the way students pursue and place value on higher education (Aud et al., 2013, Fried, 2007; Keeling, 2006; & Kuh, Kinzie, Schuh, White, & Associates, 2005). College students mature and develop not only because of what they learn in the classroom, but also because of what they learn in various out-of-classroom settings. For example, students' interaction with professors and university leaders, involvement in communities, enhancement of new personal values, and exposure to varied campus climates and expectations all have an immense impact on the evolution of these students' sense of self and worldviews, confidence, altruism, and achievement of personal identities (Longerbeam, 2005). In this context, living on campus can impact students' cognitive, social, emotional, physical, and spiritual beliefs and can play a role in students' overall development (Pascarella, 1992). And living in a residential learning community (RLC) can provide students with personal growth opportunities not always available to those living in a traditional residence-hall environment or off campus (Longerbeam, 2005).

As Chickering and Havighurst (1981) noted, "the overarching educational purpose of our colleges and universities should be to encourage and enable intentional developmental change in students" (p. 2). Furthermore, the nation's President has charged our nation to improve the outcomes at science, technology, engineering, and mathematics (STEM) institutions regarding STEM education: "...improving education in math and science is about producing engineers and researchers and scientists and innovators who are going to help transform our economy and our

lives for the better” (Obama, 2009). The task to produce both a greater quantity and higher quality of engineers in the United States is recognized as a priority (Committee on Prospering in the Global Economy of the 21st Century, 2007; National Academy of Engineering, 2005; National Science Board, 2014; Obama, 2009; Yoder, 2013). Considering Chickering & Reisser’s (1993) work in combination with the task of providing additional holistically developed STEM students reveals a clear need for STEM institutions to work toward students’ development outside of the classroom. Developing RLCs that are purposeful and conducive to students’ interpersonal relationship development can be one way in which practitioners can afford growth opportunities to this student population.

Previous research has pointed to the effectiveness of RLCs in promoting similar student-success outcomes in such communities (Zhao & Kuh, 2004). RLCs promote higher levels of student engagement and more frequent and meaningful connections with faculty (Astin, 1993; Gaff, 1970; Gamson, 2000; Inkelas, Vogt, Longerbeam, Owens, & Johnson, 2006). Furthermore, in comparison to collaborative learning that takes place in traditional housing arrangements, RLCs also promote student learning through an emphasis on collaborative learning that can more naturally extend beyond the classroom into student residences (Pascarella & Terenzini, 2005; Pasque & Murphy, 2005; Pike, 1999). Moreover, there is a growing recognition that young engineers must possess a wide array of personal, interpersonal, and system-building knowledge and skills that will allow them to function in real engineering environments and to produce real products and systems to meet enterprise and societal needs (Crawley, Malmqvist, Lucas, & Brodeur, 2011). In many ways, RLCs seem poised to help address the pressing concerns in engineering education around the promotion of learning outcomes associated with interpersonal relationship skills.

Research Problem

Industry leaders and engineering educators have called for a fundamental reform in the preparation of engineers (Prados, Peterson, & Lattuca, 2005). Interpersonal skills are becoming increasingly important in career success and advancement within engineering (Whitcomb & Whitcomb, 2013). Moreover, recent studies have shown that interpersonal relationship skills are an essential competency for an engineer (Lasley-Hunter & Preston, 2011). In response, leaders in engineering education, in conjunction with ABET, the discipline's accrediting body, have initiated a change of the goals for engineering education.

Engineers integrate their knowledge of math and sciences to create and develop products and systems. Individuals in the United States and around the world use these products and systems every day. Yet, the development of new products, systems, and innovation in the United States will suffer if students with engineering degrees do not possess a wide array of personal and interpersonal skills that allow them to function within a variety of environments (Niewoehner, 2011).

The preponderance of research on RLCs focuses on the cognitive development of students. This study proposed to find evidence in support of the literature that suggests engineering-student-specific RLCs assist in the psychosocial development of engineering students. Moreover, the literature around psychosocial development or, more specifically, mature interpersonal relationship (MIR) development, or both has focused on large research institutions or private institutions, and primarily quantitative methods have been used.

Purpose of the Study

The purpose of this study was to investigate the differences regarding the status of mature-interpersonal-relationship (MIR) development in first-year engineering students who

elected to live within RLCs when compared to the status of MIR development in those first-year engineering students who lived within a traditional residential environment at a STEM institution.

Research Questions

Based on a review of literature, the following research questions were created to address the purpose of the study and direct the data analysis:

- (a) Is there a significant difference in or interaction between the scores for the status of the mature interpersonal relationship (MIR) development of first-year engineering students, across a variety of variables (gender, first-generation status, ethnicity, and extracurricular involvement), among those students who elect to live within residential learning communities (RLCs) and the scores of those students who live within a traditional residential environment (as measured by the combined scores of the Student Development Task & Lifestyle Assessment [SDTLA])?
- (b) How well does the combination of first-generation status, gender, ethnicity, RLC involvement, and extracurricular involvement predict scores for the status of MIR development?
- (c) How do students who participate in RLCs and traditional residential environments express their lived experiences relating to developing MIR skills?
- (d) Are there logical connections between the qualitative analysis of the student focus groups and the results from the quantitative phase of the study?

Definition of Terms

The following list of terms and definitions is provided to assure a common understanding of language used throughout the study:

Engineering: The profession in which knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop economical ways to utilize the materials and forces of nature for the benefit of mankind (ABET, 2013).

First-year student: As defined by the research site, this term refers to a student who has graduated from high school (regardless of total college credits completed while in high school), or had previously graduated from high school, has a GED, or has been homeschooled but has not enrolled in a college, university, or any other school.

First-generation student: A student for whom neither the student's parents nor grandparents have earned a college degree as defined by the research site.

Learning community: An educational model that links interdisciplinary courses around a common academic or social theme (Gabelnick, MacGregor, Matthews, & Smith, 1990).

Mature interpersonal relationships (MIRs): Relationships with peers that are open, honest, and trusting; these relationships reflect a balance between dependence and self-assured independence. Moreover, the participants are interested in developing intercultural relations, appreciation for others, and tolerance for those around them. Finally, this vector indicates one's ability to accept others, respect differences, and appreciate commonalities (Chickering & Reisser, 1993).

Psychosocial development: The process of traditional-age college students moving through a "series of developmental tasks or stages, including qualitative changes in thinking, feeling, behaving, valuing and relating to others and oneself" (Chickering & Reisser, 1993, p. 2).

Traditional-age college student: An undergraduate student between the ages of 17 and 24.

Residential learning community (RLC): A common community that houses students, is developed around an academic or social program, and provides those students with an opportunity to collaborate in activities outside of the classroom.

STEM: Stands for the four primary discipline families of science, technology, engineering, and mathematics. A STEM institution has a focus on science, engineering, and the applied sciences, and grants only Bachelor of Science degrees, with no option for a Bachelor of Arts degree.

Delimitations

This study was done during the spring semester of the 2015 academic year. Those surveyed and interviewed in this study consisted of first-year engineering students at one small public, 4-year, research STEM institution located in the western United States. Furthermore, participant responses involved a self-reported quantitative instrument and were the reflection of the participants' personal experiences in a RLC. Finally, the study provided only one perspective on the MIR status of each student—that of the students themselves, and it excluded other constituents involved in the RLCs.

Limitations

Because the sample was drawn from a small public research STEM institution, the results of this study may not be generalized to other types of institutions. In the quantitative phase of the study, there was a potential risk of a nonresponse error (i.e., in the event of a low response rate, problems caused by differences between those who responded and those who did not respond) (Dillman, 2000). Furthermore, because convenience sampling was used in the quantitative phase of the study, the researcher cannot say with confidence that the sample was

representative of the population (Creswell, 2013). Additionally, because of the interpretative nature of the qualitative research, the findings cannot be generalized.

Significance of the Study

The outcomes of this study expand upon our potential understanding of the current research on RLCs by offering a broader base for the research on the characteristics these communities could give to first-year engineering students. Additionally, the outcomes of this study hold the potential to provide housing officers with additional data to support and expand collaboration with Academic Affairs in the creation of educationally purposeful residential programs; they also supply another tool for the development and evaluation of programmatic learning outcomes within residence halls.

A second and significant element of this study is the specific population that is being examined. Despite aspirations of colleges and universities to attract and retain academically high-achieving students through the implementation of RLCs, there is limited research on engineering students' collegiate experience within the context of STEM institutions and RLCs.

Researcher's Perspective

This topic is one of great personal importance because of the significant amount of time I spend developing RLCs within a STEM environment. I have the desire to better understand how RLC development and its impact on the lived student experience can improve and best serve engineering education. Likewise, I am the Director of Residence Life and Housing at a STEM institution, and I hope to improve my understanding for increased knowledge in practice and research. Additionally, I believe a mixed-methods approach gives more extensive answers than would a study that used only quantitative or qualitative methods.

The use of RLCs is widespread. Because intentional outcomes related to student-development theory as it pertains to the specific population of students in engineering education are often lacking, they should be researched. I feel that the development of interpersonal relationship skills should be a key learning outcome for any engineering program, whether that education is inside or outside of the classroom. As the literature shows, there are several benefits of RLCs that correspond with a call by engineering education forums and industry for engineers who possess interpersonal relationship skills that will allow them to develop products and systems that meet global community needs.

CHAPTER 2: A REVIEW OF THE LITERATURE

The purpose of this chapter is to provide pertinent literature related to this study. The review begins with an examination of residential learning communities (RLCs). Next, a review of literature is provided related to the psychosocial development of college students, and specifically to the development of the mature interpersonal relationships (MIRs) of college students. Additionally, a review of literature is included that focuses on engineering education in general, RLCs within engineering education, interpersonal skills within engineering education, and first-generation students within engineering education. Finally, a summary of the literature review is provided.

Residential Learning Communities

RLCs organize on-campus living arrangements so that students with similar interests live in close proximity, which increases opportunities for out-of-class interactions and supplementary learning. RLCs offer a relationship that combines experiential and reflective learning. Terenzini, Pascarella, and Blimling (1996) noted that “Students in residential learning communities not only perceive a stronger intellectual dimension to their living environment, but also perform better academically (even after controlling for pre-college achievement)” (p. 152).

Learning communities typically fall into one of four categories. The first type of learning community links academic classes with a specific cohort of students, but it does not possess a residency requirement. Learning clusters, another style of community, are similar to the linked-courses model; however, learning clusters expand the course load to three or four common classes; they also are not residentially based. The third type of community is Freshman Interest Groups (FIGs) (also sometimes called First year Interest Groups), which attempt to link courses

around a major and so provide an instant community for first-year students; FIGs do not usually include a housing element. The fourth type of community is residentially based, developed around an academic program or theme, and requires students to collaborate in activities outside of the classroom (Gabelnick et al., 1990; Lenning & Ebbers, 1999; Zhao & Kuh, 2004). The focus of this section of the literature review is specifically to examine the development and developmental theory of, and the current research regarding RLCs.

Traditionally, the difference between RLCs and residential colleges was the presence of a faculty member residing within the college and supervising a specific building or complex (Inkelas, 2008; Schroeder & Mable, 1994). As previously noted, however, the literature does not consistently differentiate between these types of communities. To reduce confusion and remain consistent with current literature, the term *RLC* will be used for both in this review unless otherwise noted.

History of Residential Learning Communities

RLC programs began in the British system of education in the late 1800s at Oxford and Cambridge universities (Blimling, 1998). The first American RLC program implementation began in 1927 at the University of Wisconsin when Alexander Meiklejohn introduced the experimental college (Blimling, 1998; Chaddock, 2008; Ryan, 1992; Smith, 2001). The experimental college sought to create an introductory undergraduate curriculum that “dissolved the distinction between academic study and college life by placing all the students in the same dormitory, along with adviser offices and a small library room” (Meiklejohn, 1932, p. xxii).

Over the past 35 years, RLCs have become a cornerstone to many residence-hall communities in higher education. The RLC is unique compared to the traditional college-housing environment in that an actual strategic plan is created in the RLC to infuse curriculum-

based learning into the residence halls. The traditional residence-hall environment may have some social and wellness-based programmatic efforts on the parts of the residence-hall staff, but few to no ties with the faculty occur centering on actual classroom material. However, research has suggested that efforts that enhance student-faculty interactions can be more effective than other attempts in achieving student-success outcomes (Garrett & Zabriskie, 2003; Shapiro & Levine, 1999; Stassen, 2003).

Effects of Residential Learning Communities

Typically, there must be collaboration between academic departments and student-affairs administrators to make a residential learning program a success. Some universities offer living learning or thematic living opportunities (or simply more academically based programmatic efforts), while many do not. However,

Despite decades of research and experience, many institutions will still fall well short of providing optimal living-learning environments for the majority of their students ... [On] too many campuses the residential experience is not organized around educational purposes. (Moneta & Kuh, 2005, p. 74)

In one analysis of a residential learning program, Johnson and Romanoff (1999) studied the Russell Scholars Program at the University of Maine after its first year as a learning community. To compare program participants, the researchers used a matched sample of program participants with a control group on age, gender, enrollment status, and entry-exam scores. Although not statistically significant, participant grades were slightly higher than the control group (2.57 versus 2.32), and participants earned more credits than did the control group (22.56 versus 19.31) after the first year of study. Program participants reported significantly higher levels than nonparticipants for both satisfaction and engagement, and greater involvement on campus.

Pike (1999) and Johnson and Romanoff (1999) found that participation in RLCs had a significantly positive effect on student interaction and social integration, and ultimately institutional commitment after they controlled for entering ability. The studies found, however, that entering ability, academic integration, and social integration primarily influenced academic achievement. Pike (1999) concluded that, although RLCs did not directly impact student persistence, after he controlled for entering ability he found that RLCs did enhance interaction between faculty and students.

Several studies (Kanoy & Bruhn, 1996; Pasque & Murphy, 2005; Schroeder, Miner, & Tarkow, 1999) have identified direct outcomes related to RLCs. Pasque and Murphy (2005) found that participation in living-learning programs at The University of Michigan was a significant predictor—over the students' past academic success, socioeconomic status, and demographics—of academic success, accounting for 1.1% variation in grades. Although small, the impact was significant. By comparing freshmen in living and learning communities to those in traditional residence-hall environments, Kanoy and Bruhn (1996) found that residents in these communities had significantly higher grades than other resident students, yet they did not have significantly different retention rates. Schroeder et al. (1999), however, reported significantly greater levels of retention of RLC participants than nonparticipants between the first and second term, with RLC participant retention at 96% and nonparticipant retention at 91%. They found that participants had higher first-to-second-year retention rates (87% for participants versus 81% for nonparticipants), and significantly higher grade-point averages (GPAs) when they controlled for entering ability (Schroeder et al., 1999).

One commonality in the studies was that the majority of them focused on outcome measures of the first-year successes of the programs. Specifically, consideration was given to

first-term or first-year persistence and academic performance measures. Few studies have considered the effects of participation in living-learning communities on the psychosocial development of engineering students enrolled within a science, technology, engineering, and mathematics (STEM) -based institution.

Assessment of Residential Learning Communities

The assessment of student-development growth related to student housing is centered in the RLC literature (e.g., Inkelas & Weisman, 2003; Inkelas et al., 2006; Pike, 1999) because there has been an increased interest in knowing how particular academic interventions within the residence-hall environment, particularly living-learning communities, affect certain student academic outcomes. A recent research initiative called the National Study of Living-Learning Programs (NSLLP) reported on a comprehensive study of the outcomes of RLC programs of many colleges and universities across the United States, which included an assessment of students' academic self-confidence (2008).

A 2003 pilot study by Inkelas et al. (2006), which utilized the NSLLP survey instrument, used five items to assess students' academic self-confidence, including confidence in conducting research, problem solving, library searches, computer abilities, and working independently. Results of the study indicated that students who lived in living-learning communities, in contrast to those students living in traditional residence halls, showed a statistically higher level of academic self-confidence. A 2007 follow-up study of the NSLLP (Inkelas, Soldner, Longerbeam, & Leonard, 2008) included three areas related to academic confidence that assessed more specific factors than the previous study: college/professional self-confidence, confidence in college courses, and confidence in skills and abilities. In terms of self-confidence, students in the living-learning environments scored higher in the follow-up study in their

confidence in college success; confidence in math, English, and writing courses; and confidence in test-taking skills.

Additionally, Inkelas et al.'s study (2008) compared three different institutional types of living-learning programs at 49 different colleges and universities in a quantitative study utilizing the NSLLP instrument. Most institutions were large research universities, with a few larger, master's degree-granting institutions. Results showed that programs effective in facilitating student-learning outcomes may be large or small, well or modestly resourced; may consist of a strong partnership between academic and student affairs; and may be primarily residential-life focused. The results of the Inkelas et al. (2008) study suggested that programs with larger enrollments but only moderate resources and insecure partnerships between academic affairs and student affairs were least effective. This important research suggested that not all residential learning programs will have the same effect on student-learning outcomes despite whatever coordinated efforts may be occurring to implement these programs. This difference can have further consequences because poorly constructed programs may not necessarily lead to positive outcomes.

The National Survey of Efforts to Improve Undergraduate Student Success and Retention (John N. Gardner Institute for Excellence in Undergraduate Education, 2011) reported that 90% of participating institutions had implemented some form of learning-community program, 56% of these programs were connected to residential learning programs, and 52% had a common intellectual theme. While there was not a complete census of RLCs, the Residential Learning Communities International Clearinghouse estimated that there are more than 200 programs on 73 campuses (Inkelas et al., 2008). As of 2014, The Learning Communities National Resources Center (Sperry, 2015) had over 300 registered learning communities listed for both 2- and 4-year

institutions throughout the United States. According to Stassen (2003), residential-learning-community participants “...show greater institutional commitment, greater intellectual development, and greater tolerance for differences, [and] demonstrated higher persistence and academic performance” (p. 583). This increase in the development of residential learning programs can be attributed to the current demand for accountability in undergraduate education, deficiencies in the levels of academic preparedness by students, and substantial changes in the globalization of the workforce.

Summary of Residential Learning Communities

Humphreys (2010) noted that the majority of the current research literature on residentially based learning communities has been conducted on programs at large public universities. The review of RLCs found that the majority of the research on residential learning programs was concentrated on large, single-institution studies, which failed to separate the various types of institutional types; also, the majority of the research focused on quantitative designs, with very few mixed-method designs. One may classify the current research in the literature as focusing on either the examination of student success or increase in retention (Gardner & Barefoot, 2011), or on a program’s value in meeting learning outcomes. This literature review found nominal research that focused specifically on the influence of RLCs within small, public, research universities or specific populations (e.g., engineering students) within institutions.

Psychosocial Development

Theories of psychosocial development, cognitive development, and moral development offer explanations of how and why college changes students. Change is how students’ cognitive and affective qualities are altered over time. Change is not labeled as positive or negative and is

value free (Pascarella & Terenzini, 2005). Similarly, development can be seen as “greater differentiation, integration, and complexity in the ways individuals think, value, and behave...[and] is typically seen as orderly, sequential, and hierarchical, passing through ever-higher stages of development” (p. 18). Blimling and Miltenberger (1990) described development as being continuous; a process rather than a state; being orderly; moving from the general to the specific and from simple to more complex; having characteristics associated with specific age levels; influenced by both heredity and environment; and occurring as a result of interactions with the environment rather than simply as an internal process of maturation.

The research of Erik Erikson and Arthur Chickering has provided the foundation for psychosocial theories of student development. Erikson’s work influenced the creation of Chickering’s theory of development (Straub & Rogers, 1986). Erikson (1968) described eight stages of psychosocial development. Each stage is bipolar and occurs at a particular time of life. The resolution of one stage affects subsequent stages. Erikson’s eight stages are (1) trust versus mistrust, (2) autonomy versus shame and doubt, (3) initiative versus guilt, (4) industry versus inferiority, (5) identity versus role confusion, (6) intimacy versus isolation, (7) generativity versus stagnation, and (8) integrity versus despair. As individuals move through each stage, they will encounter a developmental crisis, a choice between the two poles. As individuals move toward one of the poles, the crisis is resolved. According to Blimling and Miltenberger (1990), these stages are resolved by interactions between the individual and the environment.

Chickering’s original seven vectors (1969) were (1) developing competence, (2) managing emotions, (3) becoming autonomous, (4) establishing identity, (5) freeing interpersonal relationships, (6) developing purpose, and (7) developing integrity. In 1984, Chickering offered some ideas about how to revise the vectors since their introduction 15 years

earlier (Thomas & Chickering, 1984). In 1993, Chickering and Reisser published the second edition of *Education and Identity*. The new edition presented a more contemporary theory, which incorporated new findings on student development, especially in the areas of gender and ethnic studies. Chickering still used vectors as the theoretical underpinning of the model; but in recognition of new scholarship that had emerged in the 24 years since the first edition, some of the vectors were renamed and reordered. Chickering and Reisser's new configuration of the vectors was (1) developing competence, (2) managing emotions, (3) moving through autonomy toward interdependence (previously named *developing autonomy*), (4) developing MIRs (previously vector number 5, *freeing interpersonal relationships*), (5) establishing identity (previously vector number 4), (6) developing purpose, and (7) developing integrity (1993).

Psychosocial Development Within Residential Learning Communities

The effects that RLCs can have on psychosocial development have been debated. The following studies illustrate some of these developmental effects. Multiple studies have investigated the influence of RLCs by comparing students within a specific living and learning community to those in a traditional residence-hall environment (Humphreys, 2010; Leinwall, 2006; Owens, 2010).

Leinwall (2006) investigated the psychosocial development with RLCs within a large public institution. The study was a matched-group, quantitative design using a control group and an experimental group. The experimental group consisted of 121 sophomores who were participating in the College Park Scholars living-learning program at the University of Maryland. The control group was made up of 106 sophomores at the University of Maryland living in traditional residence halls who met the admissions criteria for College Park Scholars but who did not participate in the College Park Scholars Program. The Student Development Task &

Lifestyle Assessment (SDTLA) was the instrument used to measure psychosocial development. Results of this study revealed that students in the College Park Scholars Program showed an increase in psychosocial development in the tasks of Developing Autonomy, Emotional Autonomy, and Interdependence. There was no significant development for the tasks of Establishing and Clarifying Purpose and Mature Interpersonal Relationships.

Humphreys (2010) quantitatively explored whether first-year honors students at Boston College who participated in a RLC exhibited greater psychosocial development than first-year honors students who resided in traditional residence halls. The study used a pretest and posttest design. The experimental group consisted of 32 first-year honors students who resided in the Honors House, and the control group comprised 64 first-year honor students who resided in the traditional residence halls. Male and female honors students who resided in the Honors House and the traditional halls experienced similar patterns of developmental growth over the course of their fall semester. The study found that the mean scores of the first-year honors students in this study were consistently higher than the normative data, although all students showed a similar pattern of growth on all tasks, subtasks, and scales of the SDTLA.

Women's Psychosocial Development

Initial theories of student development were based on research conducted with White, male, traditional-age students and failed to consider the fact that men and women may differ in their patterns of developmental growth. Subsequent research on psychosocial development has found that women and men place different interpretations on autonomy and interpersonal relationships (Jones & Watt, 2001; Reisser, 1995; Straub, 1987; Straub & Rodgers, 1986).

The studies of Straub and Rodgers (1986) and Straub (1987) used the precursor to the SDTLA (Winston, Miller, & Cooper, 1999) to provide compelling research that showed the

sequence of the vectors was different for women and men. Straub (1987) claimed that “there was no single way to develop autonomy” (p. 204). In Reisser’s “Revisiting the Seven Vectors” (1995), the author affirmed Gilligan’s (1982) contention that men address autonomy by seeking separation and individuation, whereas women focus to preserve relationships and seek interdependence. Gilligan’s later (1987) contention should not be interpreted to mean that women do not seek autonomy. Instead, in their developmental process, women seek to master issues of interpersonal relationships, which, in turn, impacts their ability to develop autonomous relationships (Straub, 1987). In summary, based on Chickering’s theory (1993) of psychosocial development, women, in sharp contrast to men, will focus on developing interpersonal relationships before they move on to the establishment of autonomy.

Ethnicity and Psychosocial Development

As underrepresented populations continue to increase in higher education, additional research on psychosocial developmental and ethnicity is needed. Researchers over the years have begun to provide a basis for academic professionals to better understand how to achieve diversity in education. In an early study, for example, Hurtado, Milem, Clayton-Pedersen, and Allen (1999) reported that one key to enacting diversity within learning environments is to understand the policies and programs that improve the campus climate for ethnic diversity. The following studies highlight the literature in this regard, which describes how psychosocial development is different for ethnicities.

To further understand the relationship between Black northern and southern students’ psychosocial development, researchers (Itzkowitz & Petrie, 1986) used the Student Developmental Task and Lifestyle Inventory (SDTLI) to measure psychosocial development of students ($N = 234$) representing five colleges from various institutional types (public and private

universities). Itzkowitz and Petrie identified an ethnic difference in psychosocial development among the participants in this study. In the same study, the researcher found significant differences based on ethnicity. Specifically, both male and female Black freshmen from the North scored significantly lower overall than southern White students. Black males scored significantly lower on interdependence and educational plans, while Black females scored significantly lower on interdependence and all three subtasks of developing MIRs.

Taub and McEwen (1992) studied the differences in Black and White undergraduate women for psychosocial development. Their research found contradictory results to earlier studies (Itzkowitz & Petrie, 1986). Participants ($N = 218$) for this study were undergraduate females enrolled at a large, public, mid-Atlantic university. The SDTLI results showed significant differences by race only for one measure of development: intimacy (INT). Specifically, White women scored significantly higher than Black women. The study found no differences by race or interaction effects on MIRs, autonomy, or academic achievement.

In another ethnic study, Sheehan and Pearson (1995) examined the psychosocial development of Asian students. The researchers compared American first-year students ($N = 63$) to Asian international students ($N = 54$) studying at a Midwest university in America. The means for all of the SDTLI tasks of Asian international students were found to be lower than the means for the American students' tasks. Significant differences occurred between the Asian and American students amongst the tasks of Establishing and Clarifying Purpose, Developing Mature Interpersonal Relationships, and Intimacy on the SDTLI.

Pope (1998) examined the relationships between the psychosocial development of racial identity of Black, traditional-age, undergraduate college students ($N = 250$) enrolled in 44 colleges and universities. Utilizing the SDTLI tasks, the findings in this study offered support

for the influences of racial identity on psychosocial development. In particular, the results indicated differences related to racial identity on the specific psychosocial-development tasks of establishing and clarifying purpose and developing MIRs.

In more recent research, Cooper, Dean, and Bell (2007) studied the differences associated with African American students' institutional type, gender, race, and class level. Utilizing the SDTLA, the researchers identified a difference in psychosocial development attributed to race. Specifically, the mean scores by race revealed significant differences between White and African American students on the designated tasks of cultural participation, instrumental autonomy, and MIRs and the two related subtasks, peer relationships and tolerance. The results of this study provided additional empirical evidence of differences in psychosocial development among various ethnicities.

Extracurricular Involvement and Psychosocial Development

Cooper, Healy, and Simpson (1994) investigated the relationship between students' involvement in organizations and leadership positions and those students' psychosocial development. This longitudinal quantitative study attempted to identify how students change because of their involvement over time. The researchers administered the SDTLI of 1987 (Miller, Prince, & Winston, 1974) to traditional-age, first-year students at a doctoral-level institution. Those students who were still enrolled 3 years later were asked to complete the SDTLI again. The participants of both surveys ($N = 256$) also completed an additional survey regarding their usage of programs and services. Using quantitative measures, Cooper's team measured growth and change over the 3 years. The results showed that first-year students who were organization members or leaders scored significantly higher than nonmembers on the tasks of developing a purpose and life management. Students who became leaders had SDTLI scores

that were different from their peers at entry to the institution, and the opportunity to participate in leadership roles was related to continued growth for these students who began “ahead of” their peers.

Similarly, Foubert and Grainger (2006) investigated how the extent of varying levels of involvement in student clubs and organizations coincided with students’ development throughout their college career on the three scales measured by the SDTLI. A random sample of college students ($N = 307$) from a mid-sized public university in the Southeast completed the SDTLI at the beginning of their first year, the beginning of their second year, and the end of their senior year. This study concluded that students who participated in clubs or organizations from the beginning of their first year and throughout their 4 years of college had higher SDTLI scores than students who do not participate after 4 years of college.

Mature Interpersonal Relationship Development

A MIR, as defined by Chickering and Reisser (1993), is one that has well-rounded peer relationships and tolerance. Higher achievers on this task (a) have relationships with peers that are open, honest, and trusting, and their relationships reflect a balance between dependence and self-assured independence; and (b) show respect for and acceptance of those of different backgrounds, beliefs, cultures, races, lifestyles, and appearances. According to Chickering and Reisser, college students should have relationships with peers that shift toward greater trust, independence, frankness, and individuality, and in which they feel less need to conform to the standards of peers or to conceal shortcomings or disagreements. Students can distinguish between friends and acquaintances and have both kinds of relationships. Friendships survive the development of differences in activities, beliefs, and values, and reflect an appreciation for individual differences.

Mature relationships with peers are open and honest; disagreements are resolved or simply accepted (Winston et al., 1999). Furthermore, Chickering and Reisser (1993) expressed that students should be moving toward the tolerance, respect for, and acceptance of those of different backgrounds, beliefs, cultures, races, lifestyles, and appearances. Students ought to respond to individuals, not employ racial, sexual, or cultural stereotypes; have openness to new or unconventional ideas and beliefs; and be appreciative of individual differences (Winston et al.). Tolerance involves an openness to and acceptance of differences and does not mean the development of screening devices to shield one from the values and ideas of those with different backgrounds, lifestyles, or belief systems. Students high in tolerance do not shy from or reject contact with those with different ethnic, racial, or cultural heritage or with different religious beliefs, political views, or lifestyles (Winston et al.).

Sherfield, Montgomery, and Moody (2004) noted that interdependence could be crucial for human beings in all spheres of society because their interconnectedness may add to their ability to function in a healthy and happy manner. Accordingly, it can be contended that interpersonal relationships are crucial for survival because humans need one another to function successfully in society. The researchers further concluded that everything learned in life depends on the varied relationships initiated with others. In this case, the development of interpersonal relationships has become implicit in daily life. These relationships involve all the social interactions that take place in life: close relationships, friendship, couple or marital relationships, and various forms of social networks. Additionally, Firestone and Catlett (2009) advised that interpersonal relationships can be developed within social interactions.

Specifically, Chickering and Reisser (1993) cited the importance of social development or networks in the lives of college students and the notion that, in the college environment,

students become part of a community that needs them to interact with various campus constituents from diverse backgrounds; roommates, classmates, faculty, and administrators. Moreover, these researchers further stated that “sensitivity to people from other cultures needs to move beyond intellectual understanding” (p. 146).

In another study, Aidoo (2012) used a mixed-methods format to examine MIRs among international and American college students. Utilizing a sample of 93 international and 93 American students, Aidoo utilized the Mines-Jensen Interpersonal Relationships Inventory and found there were no statistically significant differences between male and female students in the self-reported levels of tolerance and quality of relationships. The qualitative data was collected through individual interviews, and the researchers noted that American and international students had different views about how student-affairs professionals could enhance tolerance among students from different backgrounds. These enhancements could include providing social-support programs for international students and expanding the general education curriculum by incorporating varied interpersonal relationship skills.

Summary of Psychosocial Development

The literature within the psychosocial development field identified an impact by other variables on student development. These variables included (a) RLCs; (b) gender; (c) ethnicity; (d) participation in extracurricular activities, and (e) MIR. There were limitations in all variables when specific institutional types were considered. Additionally, research that explored only one area of psychosocial development reflected a limitation. Moreover, the majority of research was quantitative and limited the use of qualitative or mixed-methods designs. To obtain a more accurate picture of the impact of various on-campus RLCs for first-year engineering students, the impact of all these variables must be taken into consideration.

Engineering Education

Engineering education extends over the past 200 years in higher education in the United States, but only for the past 80 years has the educational quality been controlled (Prados et al., 2005). The American Society of Engineering Education (ASEE) was founded in 1893 under the title of the Society for the Promotion of Engineering Education (SPEE). As engineering education continued to develop, there was a need for quality control regarding the type of curricula that was being developed and implemented (ASEE, 2014). Studies have been conducted to include the different types of outcomes engineering students should experience (ABET, 2013; Grinter, 1955; Mann, 1918). However, the recent *Innovation With Impact* report (Jamieson & Lohmann, 2012) stated that

Expanded collaborations and partnerships between engineering programs and (a) other disciplinary programs germane to the education of engineers as well as (b) other parts of the educational system that support the pre-professional, professional, and continuing education of engineers... (pp. 46)

are essential to graduating a diverse talent within engineering education. The need for further development and research in student affairs and engineering education is of great importance to engineering education that measures holistic success.

With the increase in the importance of developing engineering students and the educational environment in which these students enroll, there is a need for a different type of engineering graduate (Redish & Smith, 2008). A number of studies have been done that reflect the view about how to educate and develop engineering students to be successful in the traditional engineering fundamentals, but also to develop the knowledge and skills in those students associated with global collaboration, management, communication, ethics, and economics (Boeing, 1997; National Academy of Engineering, 2005; Pellegrino, 2006). In this section, the research and literature regarding engineering education outside of the classroom and

what has been proposed for further development of engineering students in the United States who have graduated is reviewed.

As suggested earlier, engineering students' development is shaped not only by what happens in the classroom, but also by experiences outside of the classroom. In a study of the learning of engineering seniors, out-of-class experiences made statistically significant and independent contributions to learning, although curricular and classroom experiences were the most powerful effects on learning (Lattuca, Terenzini, & Volkwein, 2006). Strauss and Terenzini (2007) found that, in addition to their in-classroom experiences, engineering students' out-of-class experiences made significant and unique contributions to their analytical and group skills. These findings support the suggestion that students develop academic knowledge and skills through formal or informal activities related to curricula outside as well as in the classroom.

Recent research (Allendoerfer et al., 2012) identified that when students, specifically from STEM institutions have communities that are engaging, the level of academic engagement increases. The multi-institutional study revealed that family is the community to which students feel most connected, with friends being secondary. Results suggested that, among the many types of needs studied, providing students with opportunities also increases their chances for engagement in academic efforts.

Residential Learning Communities Within Engineering Education

There are few studies of RLCs in engineering education. Until recently, the majority of RLCs for undergraduate engineers were general STEM-based theme housing. Furthermore, these RLCs were normally small and often targeted specific populations of underrepresented students. For example, there have been efforts to create Women in Science and Engineering

(WISE) RLCs at institutions across the country. WISE programs are often based in a residence hall for women majoring in STEM fields. These programs usually include various programmatic components such as (a) student-faculty mentoring programs, (b) programs to expose and encourage women toward STEM careers, and (c) disciplinary support in the form of advising or tutoring (Hathaway, Sharp, & Davis, 2001; Pace, Witucki, & Blumerich, 2008).

Data from WISE programs have indicated that RLC participants had a higher GPA at the end of the academic year and were more likely to remain enrolled in college (Pace et al., 2008). The study was a mixed-methods study with 46 participants that also described the rationale and the step-by-step process used for setting up a WISE learning community at one institution. The Pace et al. paper reported that retention remained a problem, with higher percentages of female students dropping out of science, math, and engineering areas at the research site when compared to their male counterparts. Overall GPA for students in the first year of WISE (2.87) was slightly higher than for all first-year students with similar majors to WISE (2.76). Retention rates for WISE students from the first year to the second year were higher (93.6%) compared to retention rates for all first-year students at the research site (82.0%).

McKelfresh (1980) quantitatively examined engineering students at a large public research institution using an instrument developed by the researcher. The study found that students ($N = 397$) in an engineering RLC reported a closer connection to the college of engineering than those students living in traditional halls and those students living off campus. McKelfresh reported that students in the RLC felt a greater sense of rapport with fellow engineering students than those not in the RLC. Moreover, the study reported greater awareness of tutoring services and other academic assistance programs. However, RLC participants did not differ from nonparticipants in terms of college GPA (McKelfresh).

In another study, Wawrzynski, Jessup-Anger, Stolz, & Helman (2009) quantitatively examined the contribution of a residential program on adjustment to college and the fall-semester grade point average for 174 first-year science and engineering students. Specifically, social and academic aspects were examined to determine the relationship with academic adjustment, social adjustment, and fall-semester grade point average. The Student Adaptation to College Questionnaire was used, and a survey design measured students' involvement with the academic and social aspects. Significant predictors for academic adjustment were knowing one's roommate prior to college and the grade received for the seminar class required as part of the living and learning community program.

A quantitative study conducted on women participating in a women-only STEM RLC (the Women in Science and Engineering Residential Program, or WISE-RP) at a large, public research institution reported more nuanced effects on retention (Hathaway et al., 2001). There were 1,852 students in the study's sample; 264 of these students were WISE-RP participants between 1993 and 1997. There were also two control groups, one consisting of women ($N = 794$) and one consisting of men ($N = 794$), who were science or engineering majors but not part of the WISE-RP. The three groups were also matched on high-school GPA, SAT or ACT score, and high-school type. The authors found that WISE-RP women were retained in science majors at a significantly higher rate than their male and female counterparts in the control samples. There were no significant differences in retention rates among WISE-RP women, women in the control group, and men in the control group.

Micomano (2011) quantitatively investigated the effect of RLCs on disciplinary retention and learning outcomes in first-year engineering students ($N = 499$) within a large public research institution. The study identified the differences between RLC participants and

nonparticipants in terms of (a) precollege characteristics, (b) indirect measures of persistence, (c) direct measures of persistence, and (d) learning outcomes. The results of the study identified some differences between the two groups on precollege characteristics in terms of demographic representation, the process of choosing engineering as a major, and expectations for college.

Interpersonal Development Within Engineering Education

Currently, very few dependable texts or development models are available for interpersonal development skills in engineering settings to benefit college students, including entry-level and experienced engineering professionals (Whitcomb & Whitcomb, 2013). Very little studies have been done to address the interpersonal dynamics of engineers, but some studies have addressed the interpersonal development of engineering college students or professionals (Lasley-Hunter & Preston, 2011; Niewoehner, 2011; Whitcomb & Whitcomb, 2013).

First-Generation Students in Engineering Education

The definition of *first-generation college student* (Choy, 2001; Nuñez & Cuccaro-Alamin, 1998) varies, but the rationale for the label is consistent: A first-generation college student is one whose parents retained limited understanding of the differences between the secondary school and the postsecondary learning environment. Such differences range from expectations of faculty, to the time college students should spend studying, the importance of campus involvement, and the value of relationships with peers from different backgrounds. First-generation college students neither have the social capital to know what to expect when they arrive, nor do they know how to plan for an effective transition from high school to college (McCarron & Inkelas, 2006; Reid & Moore, 2008; Richardson & Skinner, 1992).

In this context, and in particular to engineering students, Strutz, Orr, and Ohland (2012) discussed barriers at every stage of pursuing and completing an engineering degree, from lower

enrollment and persistence, to students' ability to make decisions to support educational goals. Research on the success of low-income and first-generation students in engineering programs has identified many barriers that these students must overcome, including inadequate preparation in grades K through 12, little exposure to engineering or engineering role models, difficulty in choosing a major, financing, and limited engagement with faculty and supportive peers (Strutz, Orr, & Ohland, 2012).

In addition to challenges for students associated with their parents' education levels and socioeconomic status, McLoughlin (2012) identified several barriers that prevent first-generation college students from becoming engineers, such as lack of understanding of what engineers do, and misunderstanding about differences in careers in trades from those in a profession. As a result, students may select shorter-term programs, such as drafting, over a longer-term career such as engineering (Packard & Babineau, 2009).

Summary of Engineering Education Research

Overall, research in the area of engineering students specific to RLCs is somewhat limited, although previous work has described RLCs for engineering students and found that RLCs are effective for enhancing student engagement, retention, and academic success. Moreover, research within the focus of interpersonal relationship development for engineering students is nonexistent, despite the need for further development in this area. Finally, the first-generation population that is struggling for success and helping diversify engineering will need to be researched further to help expand the literature within this area.

Chapter Summary

This review of the literature has included the examination of literature pertaining to RLCs, psychosocial development of college students, and engineering education. The

concluding portion of this examination highlighted particular gaps in the literature and called for future research.

Inkelas and Weisman (2003) noted that the majority of the current research literature on RLCs has been conducted on programs at large public universities. This review also found that the majority of the research on living-learning programs is concentrated on large, single-institution studies. Further, the current research may be classified as it focused on either the examination of intellectual growth (Shapiro & Levine, 1999) or a program's effectiveness in meeting learning outcomes. In this literature review, minimal research was found that focused specifically on the influence of RLCs on a student's psychosocial development, and particularly MIR development.

Despite aspirations of colleges and universities to attract and retain academically high-achieving students through the implementation of RLCs, there is limited research on engineering students' collegiate experience within the context of STEM institutions and RLCs. Additionally, in *Effective Interpersonal and Team Communication Skills for Engineers*, the researchers found that minimal studies and models exist that focus specifically on the interpersonal skills of engineers (Whitcomb & Whitcomb, 2013). Given the need to assure consistent variables in the research, an ideal population for such studies would be engineering students. These facts, combined with Pascarella and Terenzini's (2005) suggestion that future research should examine the variance effects between various residence-hall arrangements, provide a focus for future research to compare the MIR development of first-year engineering students who reside in RLCs and those who live in a traditional hall environment.

In brief, the findings of this review pointed to a gap in the literature, which provides an opportunity for new research—specifically, the study of the MIR development of engineering

students who reside in RLCs. Moreover, given that the multitude of current research is focused on large public institutions, an available area in which to examine the impacts of these factors would be at a small or medium-sized private or public STEM-focused institution. For example, the study could assess whether the influences of environment, faculty, and peers in a RLC show a clear and positive relationship with students' psychosocial development.

CHAPTER 3: RESEARCH METHODOLOGY

This chapter includes a description of the sequential explanatory mixed methods used to conduct this study. The purpose of the study, research questions, and design are identified. The sample population and size, a description of participants of the study, and the selection for research design and its appropriateness for this study are also included. Two distinct phases are described within individual sections. In addition, within the methodology section, data-collection procedures, data-analysis techniques, and the reliability, validity, and trustworthiness of the research are discussed.

Purpose of the Study

The purpose of this study was to investigate the differences in the status of mature interpersonal relationship (MIR) development between first-year engineering students who elected to live within residential learning communities (RLCs) when compared to those students who lived within a traditional residential environment at a science, technology, engineering, and mathematics (STEM) institution.

Research Questions

The following research questions were created to address the purpose of the study and direct the data analysis:

- (a) Is there a significant difference in or interaction between the scores for the status of the mature interpersonal relationship (MIR) development of first-year engineering students, across a variety of variables (gender, first-generation status, ethnicity, and extracurricular involvement), among those students who elect to live within residential learning communities (RLCs) and the scores of those students who live

- within a traditional residential environment (as measured by the combined scores of the Student Development Task & Lifestyle Assessment [SDTLA])?
- (b) How well does the combination of first-generation status, gender, ethnicity, RLC involvement, and extracurricular involvement predict scores for the status of MIR development?
 - (c) How do students who participate in RLCs and traditional residential environments express their lived experiences relating to developing MIR skills?
 - (d) Are there logical connections from the qualitative analysis of the student focus groups that connect with results from the quantitative phase of the study?

Research Design and Rationale

A mixed-methods design (Tashakkori & Teddlie, 2010) was used for this study; this approach is a procedure for collecting, analyzing, and mixing both quantitative and qualitative data at some stage of the research process within a single study, to understand a research problem more completely (Creswell, 2013). The rationale for integration is that neither quantitative nor qualitative methods are sufficient by themselves to capture the trends and details of the situation, such as experiences of first-year engineering students' experience in RLCs. When combined, quantitative and qualitative methods complement each other and allow for more complete analysis (Tashakkori & Teddlie, 2010).

Mixed-methods research is more than simply collecting and analyzing two different types of data; it also entails the use of both quantitative and qualitative approaches so that the overall strength of a study is improved (Creswell & Plano Clark, 2011). Within mixed-methods research, the study can build on the knowledge of pragmatism (Biesta, 2003). A major tenet of pragmatism is that quantitative and qualitative methods are compatible. Therefore, both

numerical and text data, collected sequentially or concurrently, can help to better understand the research problem (Tashakkori & Teddlie, 2010).

This study used a sequential, explanatory, mixed-methods design that consisted of two distinct phases (Creswell, 2013; Creswell & Plano Clark, 2011). By using both quantitative and qualitative designs, the researcher could anticipate both statistical significance and interpretive meanings. In the first phase, the quantitative numeric data was collected using a Web-based survey and then the data was analyzed. In the second phase, the qualitative data was collected through focus groups and then interpreted to capture the themes and experiences that surrounded MIRs with first-year engineering students in the study. The integration of the results of the two phases is included in the discussion of the outcomes in chapter 5.

Participants and Site

Upon receipt of clearance from the Institutional Research Board (IRB) at Colorado State University (CSU) and the research site, permission to collect the data was approved (see Appendix D). The IRB was used for “assessing the potential for risk, such as physical, psychological, social, economic, or legal harm, to participants in the study” (Creswell, 2013). Participants also remained anonymous to provide an honest and open environment for the survey and focus groups. In addition, approval by the appropriate Residence Life staff at the research site was obtained. With that permission granted, the research site’s Residence Life staff provided the researcher with the email addresses of first-year students residing within the residential environments.

The population considered for this study consisted of first-year, traditional-age engineering students living on campus within university housing at the research site during the

spring of 2015. The study was administered within one STEM institution in the western United States.

The research site was a medium-sized public STEM and applied-science university with approximately 4,150 undergraduate students. The university was a highly selective institution with only Bachelor of Science (no Bachelor of Arts) degrees conferred. First-year engineering students were required to live on campus ($N = 964$). Further, first-year students could elect to apply to live in one of the four RLCs offered. The RLCs included (a) Adventure Leadership ($N = 47$), (b) Oredigger Leadership ($N = 64$), (c) Visual and Performing Arts ($N = 29$), and (d) Athleticism and Wellness ($N = 58$). The learning communities were developed as a collaborative effort between Residence Life staff and academic faculty. The goals of the learning communities were for students to connect with people who have similar interests; to create environments in which each person's experience and education is enriched by other students with a similar interest; to offer programs with community and learning in mind; to form residential environments beneficial to personal and academic growth; and to develop social responsibility through experience and accountability. Each program included a live-in Residence Life Coordinator who was responsible for the overall supervision of each building; a designated academic faculty member who participated in community gatherings; resident assistants (RAs) who lived on each of the floors; and programming assistants who helped organize community activities and programs for each floor.

All students living in traditional residential communities received opportunities to attend community activities held by the RAs that focused on community building and education (health and wellness; diversity and inclusion; community service and advocacy; academic skills and success; career preparation; and sustainability and environmental awareness). Additionally, each

RLC received access to all of the community activities that a traditional residential program received, in addition to programs that were centered on the theme of that particular community. The Adventure Leadership Community also was provided with an experiential preorientation trip that no other community was offered during the time of this study. Finally, all first-year students were required to take a common first-year-experience course. The RLCs were clustered by section and by community to take the course, and other residential students were randomly assigned to sections.

During the spring semester of 2015, the Department of Residence Life provided the email addresses of 964 first-year students living in the residence halls. Within this population, 198 students participated in RLCs. During March 2015, RAs hosted a community meeting in which all residents were asked to complete the survey. The researcher had notified the residents via email, explaining the study, prior to the community meetings. Then three follow-up emails to residents so that all residents, including those who were not present in the initial community meeting, had the opportunity to participate in the survey.

Phase 1: Quantitative

The quantitative portion of the sequential, explanatory, mixed-method-design research was conducted using an existing survey instrument, the SDTLA, and solely using its MIR construct. A nonexperimental comparative approach was selected because of the researcher's interest in the attribute independent variables, and to explore the relationship between the independent and dependent variables (Gliner, Morgan, & Leech, 2009). The quantitative analysis was completed before the data was collected from Phase 2.

Instrument

As noted, a previously established instrument, the SDTLA, and specifically the MIR construct, was used in this study. The SDTLA is a tool designed to assess psychosocial student development as described by Chickering (Winston et al., 1999). This instrument measures psychosocial development in the areas of life purpose, MIRs, academic autonomy, and the establishment of healthy lifestyles (Winston et al., 1999). The theoretical foundation and guiding force for the current version of the SDTLA is based on Chickering and Reisser's (1993) theory of psychosocial growth. The self-reported instrument measures a sample of behavior and reports feelings and attitudes that students are expected to exhibit upon achievement of particular developmental tasks common to traditional-age (17 to 24) college students (Winston et al., 1999).

The SDTLA builds upon Chickering and Reisser's (1993) revision of Chickering's (1969) theory of educational identity. For the purpose of this study, the researcher focused solely on the task and related subtasks of the MIR construct. He obtained appropriate permissions from the respective authors to use this portion of the instrument. The current version is a 24-multiple-choice question, self-reported survey, and it employs a five-point Likert scale with 5 representing the most highly developed in measuring the development status of MIR. Two subtasks also exist to further clarify the descriptions of the MIR task; these subtasks include the development of peer relationships (PR) and tolerance (TOL) descriptions of the MIR task. The instrument results in one score for the task (MIR) and subtasks (PR and TOL).

Measurement of the MIR task is determined by both how students view their relationships with peers and their respect for those who possess different backgrounds or beliefs. The two specific subtasks within this category are Peer Relationships (PR), which assesses a

student's ability to develop open and honest relationships with friends, and Tolerance (TOL), which measures not only a student's ability to accept difference, but also the ability to seek out and engage people with differing backgrounds, beliefs, or worldviews. Because of the relatively low alpha coefficients from the subtask, Winston et al., (1999) recommended that for research purposes a more reliable measure was the total task scores.

Reliability and Validity

The SDTLA has been evaluated for estimations of reliability using a Cronbach alpha test. Winston et al. (1999) conducted the test-retest method over a 4-week period at two different institutions. Results of the testing found that with $p < .01$, the correlations for all tasks and subtasks ranged from .70 to .89, with an average of .80 (Winston et al.). The developers concluded that the SDTLA does have "temporal stability" and "is more than adequate for group data" (Winston et al., p. 27). In relation to internal consistency, the alpha coefficients ranged from .62 to .88 based on a large group of students ($n = 1822$) at institutions in North America (Winston et al.). Specifically, in regard to the MIR and the subtasks related to this construct, reliability estimates (MIR = 0.79, TOL = 0.78, and PR = 0.73) had an alpha ≥ 0.70 , which provide strong evidence for internal consistency for the SDTLA instrument.

To test the validity of each task and respective subtasks, the developers of the SDTLA identified other instruments in which the scales were conceptually related to the various task and subtasks. Winston et al. (1999) used intercorrelations of tasks, subtasks, and scales to estimate construct validity. These intercorrelations yielded validity estimates of 0.10 to 0.73, with seven of the intercorrelations falling below 0.20. These values indicate that several of the measures were at least moderately correlated with each other. In addition, the SDTLA was correlated with several other instruments that were developed using similar constructs and development-theory

background (Winston et al., 1999). Correlations of the other instruments with the three tasks included in the SDTLA yielded scores ranging from 0.27 to 0.62. These correlation values indicate a moderate level of estimated construct validity. Finally, Wachs and Cooper (2002) completed an additional validity study using a longitudinal research method. The conclusion of the study yielded results that were significant in showing the validity of the task and subtasks for measuring the psychosocial development of college students.

Data Collection

The SDTLA was administered in March of the 2015 spring semester via SurveyMonkey. The 8-month acclimation period between the beginning of the fall semester in 2014 and March 2015 allowed the students an opportunity to experience the college and residential environment. Without this acclimation period, the students may have not yet been exposed to particular activities for which the instrument investigates (Winston, et al., 1999).

All students received an initial email informing them of the purpose of the study, upcoming community meetings during which they could complete the study survey, and average survey-completion time; assuring them of the confidentiality of their data and also the lack of risks for their participation; and giving them information regarding the raffle for ten \$25 gift cards for participants who completed the survey (see Appendix B). Finally, all students received the contact information for the CSU Research Integrity & Compliance Review Office and research site, the Office of Research and Administration, and the researcher's work contact information in case they had any questions or concerns about this study.

Each RA was required to host a mandatory community meeting in the month of March, at which each resident should be present. During this time, the RA requested that each resident complete the survey. Each student had been provided with a survey link, so the participants

could complete the survey either online at their own convenience or during the community meeting. The survey remained open for 30 days after it was initially distributed to allow time for students to complete it. Students were sent three follow-up reminder emails after the initial distribution of the survey instrument. Each reminder email provided them with the same instructions as the initial email. After the 30 days, the survey was closed, which prevented any other students from participating.

The participants were asked to complete research questions that requested their (a) gender, (b) affiliation with an engineering club/organization, (c) level of attendance at extracurricular activities within their community, (d) first-generation status, and (e) ethnicity/race. The participants then completed the MIR questions of the SDTLA, which measured the status of students' development of MIRs. During the survey, all students were asked about their willingness to participate in a follow-up focus group for a separate survey whose purpose was to ensure confidentiality of the SDTLA survey responses.

Data Analysis

Descriptive and inferential statistics were used to analyze the data collected. The data set was analyzed using *Statistical Package for the Social Sciences (SPSS) 22.0*. The independent variable data was coded and entered into SPSS. These variables included RLC involvement, type of RLC, gender, first- or continuing-generation status, ethnicity/race, and involvement in extracurricular activity. Once the data was collected, ethnicity/race were aggregated into two sets: underrepresented and white/Caucasian. The dependent variable in this study was the main task score, MIR, obtained from the SDTLA.

The continuous dependent variable data also was entered into SPSS. The standard score was used to measure the status of the task related to developing MIRs. The researcher followed

the recommendations of Winston et al. (1999), who suggested that the more reliable measure would be the total MIR task score because of the relatively low alpha coefficients for the subtasks. To score the MIR, the *SDTLA Technical Manual* procedure was followed:

- (1) Identify the items that compose each subtask and scale.
- (2) Sum the values for each item that is included in the subtask/scale [values for each response are provided on a separate scoring key].
- (3) Divide the sum for the subtask/scale by the number of items to which the student responded [item responses for most subtasks/scales can range from 1 to 5]. (Winston et al.)

After this, each student was given a score, which was used as the dependent variable.

An alpha level of 0.05 was used for this study. The alpha level is the probability of making a Type I error, which means rejecting the null hypothesis when it is true. The alpha level most commonly used in social-science research is to establish this probability value as 5 times in 100, or 0.05. This error rate of 5% has been acknowledged as the normal percentage of accepted error (Hinkle, Wiersma, & Jurs, 2003). Following, the first two research questions were used to outline a specific data-analysis strategy to address the intent of each research question by identifying variable type and level of measurement, and the appropriate statistic as suggested by Field (2005) and by Leech, Barrett, and Morgan (2014).

Research Question 1: Is there a significant difference in or interaction between the scores for the status of mature interpersonal relationship (MIR) development of first-year engineering students, across a variety of variables (gender, first-generation status, ethnicity, and extracurricular involvement), among those who elect to live within residential learning communities (RLCs) and the scores of those students who live within a traditional residential

environment (as measured by the combined scores of the Student Development Task & Lifestyle Assessment [SDTLA])?

- Independent variables: The independent variables in this research question were identified as gender, first-generation status, ethnicity, and extracurricular involvement.
- Dependent variables: The dependent variable MIR was measured as a computed score.
- Statistical test: Analysis of variance (ANOVA) (2x2) was used to determine whether there was an interaction effect between independent variables on a continuous dependent variable.

Research Question 2: How well does the combination of first-generation status, gender, ethnicity, RLC involvement, and extracurricular involvement predict scores for the status of MIR development?

- Independent variables: The independent variables in this research question were identified as first-generation status, gender, ethnicity, RLC involvement, and extracurricular involvement.
- Dependent variables: The dependent variable MIR was measured as a computed score.
- Statistical test: Multiple regressions were used to predict the dependent variable based on multiple independent variables. Additionally, this method allowed the researcher to determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained. A chi-square test was then selected to determine the association between variables.

Phase 2: Qualitative

The qualitative portion of the sequential, explanatory, mixed-method-design research was conducted through small focus groups in which the researcher collected data to help find meaning in the data collected during the quantitative analysis. By using a mixed-methods approach, he was able to collect and analyze both empirical and interpretive data. According to Creswell (2013),

the procedure for a qualitative study includes advancing the assumptions of qualitative designs, indicating the specific type design, reflecting on the researcher's role, discussing the data collection, developing data recoding procedures, identifying data analysis procedures, specifying verification steps, and delineating the narrative outcomes of the study. (pp. 143–144)

By using both quantitative and qualitative designs, the researcher was able to anticipate both statistical significance and interpretive meanings.

In phenomenology, the researcher transcends past knowledge and experience to understand a phenomenon at a deeper level (Miles & Huberman, 1994). Creswell (2013) stated, “phenomenological research is a strategy of inquiry in which the researcher identifies the essence of human experiences about phenomenon as described by participants” (p. 13). The type of problem best suited for this form of research is one for which it is important to understand several individuals' common or shared experiences of a phenomenon (Kruegger & Casey, 2015).

Data Collection

The data was collected through two focus groups, one consisting of RLC residents, and one consisting of traditional-hall-environment residents. According to Kruegger and Casey (2015), a focus group is

a technique involving the use of in-depth group interviews in which participants are selected because they are a purposive, although not necessarily representative, sampling of a specific population, this group being ‘focused’ on a given topic.’ (p. 15)

The groups provide an opportunity to ask open-ended and nondirective questions (Creswell, 2009; Willig, 2001). In the current study, two focus groups were established, traditional residential communities and RLCs, to study the differences. The data collection for this study was based on purposive sampling, which means that the participants were selected according to their “criteria of relevance to the research question” (Willig, 2001, p.58). Additionally, students were asked to participate voluntarily as part of the survey in Phase 1. The focus groups took place during April of 2015.

The two focus groups for collecting data began following the selection of the participants from the survey, in Phase 1 of this study. Each participant received a copy of the consent form by email (see Appendix D) and electronically returned the completed form. Students were assigned times to meet for their focus groups. The semistructured focus group was scheduled for a duration of 60 minutes and was held in a room that was free from interruption. Upon arrival at the interview, the participants were given a brief overview of the research study, which included alias names to ensure confidentiality of each participant. Once the overview was completed, the researcher conducted the 60-minute, semistructured focus-group interview. Participants received a \$10 gift card for their participation, which was sent to them via email at the end of the focus group.

Using Krueger and Casey (2015) as a guide for this study, the researcher developed the focus-group questions so that they originated with general questions and responses, and then moved into specific questions and answers. An audio recording was made of each focus-group interview. Several recording devices were available during the interview to preclude technical issues and allow the focus group to proceed (Groenewald, 2004). During the interview, the researcher also had an additional note taker to ensure that the correct data was captured. This

note taker was a Residence Life professional staff member who was familiar with the residential environments, which helped to ensure that terminology used was clear to her.

Data Analysis

A systematic approach to the qualitative data analysis was used. Systematic analytic procedures help ensure that findings reflect what was shared in focus groups (Krugger & Casey, 2015). First, the researcher used a template approach, applying the theoretical framework from Chickering's theory of identity development (Chickering & Reisser, 1993), and specifically his description of MIRs. Applying Chickering's concept of MIRs as a lens, the subconstructs of peer relationships and tolerance were applied during the deductive coding. Next, the focus groups were then reanalyzed for additional elements using an emergent-analysis process applied during the inductive coding.

A full transcript was prepared using the audio recording of each group and the transcripts were supplemented with the field notes. The steps in the qualitative analysis included (1) preliminary exploration of the data by reading through the transcripts and field notes; (2) coding of the data by using a template analysis for deductive coding; (3) use of emergent analysis for the inductive coding; and (4) construction of a narrative (Creswell, 2009).

Reading the transcripts. Following the data-analysis framework described by Creswell (2007), the researcher immersed himself in the original data by listening to the recordings twice while reviewing any field notes that were written. According to Creswell (2007), reading and memoing the text, while immersing oneself into the data fully, is one of the first steps in analyzing the data.

Coding the data. Next, each transcript was imported into NVivo 10 qualitative data-analysis software, and the software was used to further identify word and phrase repetitions

within each interview. This second step included identifying text segments, placing a bracket around them, and assigning a code word or phrase that accurately described the meaning of the text. In addition to using NVivo 10 to organize the data, the researcher transferred the highlighted passages and comments to a Word document to further visualize the data.

Analyzing the template. The third step was to identify themes for each transcript. The themes were identified with a focus on what was crucial in the text and the notes within each focus group as they related to the theoretical framework used in this study. The theoretical framework of Chickering's (1993) psychosocial development and how students develop their MIRs was applied using this lens for the deductive coding. King (2004) stated that template analysis "...refers rather to a varied but related group of techniques for thematically organizing and analyzing textual data" (p. 256). Moreover, the spirit of template analysis is that the researcher produces a list of codes ("template") that represent themes identified in their textual data (King, 2004). Finally, the use of direct quotes from the participants was essential in the data-analysis section of the research (King, 2004).

Applying inductive analysis. Next, the researcher applied the inductive lens while using an emergent-analysis approach to reanalyze the interviews for elements that were missed and to develop new themes around the data that emerged that related to developing interpersonal relationships for the students who attended the focus groups. Emergent-theme analysis is an inductive approach to qualitative social-science research and is derived from the lived experiences of research participants through the process of coding (Given, 2008).

Moving to the next group. Each of the first steps was repeated for each focus group that was conducted before the final step was implemented, in which the researcher compared the groups for patterns.

Trustworthiness

Trustworthiness is a significant element to preserving accuracy and credibility in the findings (Creswell, 2009). Creswell outlined qualitative validity as “checks for the accuracy of the findings by employing certain procedures” and qualitative reliability as “consistent across different researchers and different projects” (p. 190). Creswell suggested not making mistakes during transcription, and having an expert cross-check the coding process. A qualitative expert also served as the cross-checking expert for this study.

Four forms of trustworthiness strategies were used in the second, qualitative phase of the study: (a) member checking (see Appendix F), (b) clarifying bias, (c) memoing, and (4) the use of an expert qualitative-research methodologist for guidance (Creswell, 2009). The researcher provided themes, thoughts, and categories to the participants for review, for accuracy of the findings. This step ensured that the transcripts actually recorded what the interviewees meant to say about the topic (Lincoln & Guba, 1985). Continued conversation throughout the narrative report regarding the researcher’s bias in this study helped strengthen the participants’ stories and offer a candid reflection of the research. Moreover, the use of memoing helped ensure a proper recording of reflective notes about what the researcher learned from the data (Given, 2008). In addition, he used the log immediately after each interview to allow him to record any immediate reflections. Last, as previously stated, a qualitative expert was able assist in providing feedback and accountability during the analysis of the data.

Summary

In this chapter, the sequential explanatory mixed-methods design of this study, which consisting of two distinct phases (Creswell, 2013; Creswell & Plano Clark, 2011), has been outlined. Also included in the chapter are the research questions and research design for both

phases; a description of the sample population; and a listing of the methods for data collection and data analysis, along with comments about the reliability, validity, and trustworthiness of the study.

Numerically coding each returned questionnaire and keeping the responses confidential protected the anonymity of participants. While the focus groups were conducted with the selected respondents, participants were assigned fictitious names for use in the descriptions and for reporting the results. All study data, including the survey electronic files, interview files, and transcripts, were kept in a locked file in the advisor's office and will be destroyed after a 3-year period.

CHAPTER 4: RESULTS

The purpose of this study was to investigate the differences between the status of the mature interpersonal relationship (MIR) development of first-year engineering students who elected to live within residential learning communities (RLCs) when compared to that development in those who lived within a traditional residential environment at a science, technology, engineering, and mathematics (STEM) institution. Results were categorized according to the research phases and by research question.

Phase 1 Results

The focus of the first phase was to explore any differences, interactions, and association between students' MIR status scores. This phase included a survey to all first-year engineering students who resided in the residence halls at the research site.

Participants

The population considered for this study consisted of first-year, traditional-age engineering students living on campus within university housing at the research site during the spring of 2015. The study was administered within one STEM institution in the western United States. First-year students were required to live on campus ($N = 964$). Further, first-year students could elect to apply to live in one of the four RLCs ($N = 198$) offered. The RLCs included (a) Adventure Leadership ($N = 47$), (b) Oredigger Leadership ($N = 64$), (c) Visual and Performing Arts ($N = 29$), and (d) Athleticism and Wellness ($N = 58$). The traditional residential environment ($N = 766$) consisted of first-year students housed across campus in various residential-style housing (traditional, modified traditional, suite, and semisuite style).

Descriptive Statistics

The administration of the survey to the 964 first-year students yielded a response rate of 62%, with 602 students completing the initial survey. Winston et al. (1999) recommended that participants who fail to answer 12% of the questions on any task or subtask be removed from the analysis. After review, 587 students completed the survey appropriately, and 15 students were removed from the data set due to incomplete responses. Furthermore, students who identified as “other” ($N = 5$) in the identified gender question were removed from the data set because of the limited mathematical parameters of the statistical analysis being used (Gliner et al., 2009). The total completed surveys for usable data were $N = 582$.

In a response comparison, RLC students ($N = 159$) responded with an 80% rate, versus a 33.3% response rate from students who resided in a traditional residential environment ($N = 423$). Of the 582 students who completed the survey, 35.6% were female and 64.4% were male. Within the RLC students, the gender breakdown was 54.1% female and 45.9% male; however, within the traditional residential environment, the gender breakdown was 28.6% female and 71.4% male. In terms of ethnicity, 20.3% of the respondents self-identified as underrepresented (Black/African American, Hispanic/Latino/Mexican American, Asian American/Pacific Islander, Native American, Biracial, or Multiracial), and 79.7% of respondents self-identified as White or Caucasian. Additionally, first-generation students' ($N = 74$) response rate was 52.4%. Representative comparisons of participants in this study by race were reasonably similar to the overall first-year students; however, in regard to gender and first-generation students, there was a slightly higher participation rate among females and first-generation students compared to the percentage of all women and students in the residence halls.

See Tables 4.1 through 4.4 for the complete breakdown of response rate by gender, ethnicity, first-generation status, and RLCs.

Table 4.1

Gender and Living Environment of Respondents

	Female		Male		Total	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Residential Learning Communities (RLCs)	86	54.1	73	45.9	159	100
Traditional Residential Environments	121	28.6	302	71.4	423	100
Total	207	35.6	375	64.4	582	100

Table 4.2

Ethnicity of Respondents

	Underrepresented		White or Caucasian		Total	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Residential Learning Communities (RLCs)	34	21.4	125	78.6	159	100
Traditional Residential Environments	84	19.9	339	80.1	423	100
Total	118	20.3	464	79.7	582	100

Table 4.3

First-Generation Status of Respondents

	First Generation		Not First Generation		Total	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Residential Learning Communities (RLCs)	20	12.6	139	87.4	159	100
Traditional Residential Environments	54	12.8	369	87.2	423	100
Total	74	12.7	508	87.3	582	100

Table 4.4

Residential Learning Communities (RLCs) by Community

	<i>N</i>	%
Adventure Leadership	40	25.2
Oredigger Leadership	62	39.0
Visual & Performing Arts	28	17.6
Athleticism & Wellness	29	18.2
Total	159	100.0

Research Question 1

The first research question was

Is there a significant difference in or interaction between the scores for the status of the mature interpersonal relationship (MIR) development of first-year engineering students, across a variety of variables (gender, first-generation status, ethnicity, and extracurricular involvement), among those who elect to live within residential learning communities (RLCs) and the scores of those students who live within a traditional residential environment (as measured by the combined scores of the Student Development Task & Lifestyle Assessment [SDTLA])?

To analyze this question, a series of factorial analyses of variance (ANOVAs) was used.

The mean MIR status scores and the standard deviations are presented in Table 4.6. The *n* value for males was 375 and for females was 207. The mean MIR score for females was 52.43 and for males was 55.09 (Table 4.5). Although the males' score was higher, there was a statistically significant interaction between gender and the MIR score (Table 4.6). The eta squared, an index of association, was low, ranging from .011 to .028; these values indicate that from 1.1% to 2.8% of students' MIR status could be predicted by gender. Additionally, 2x2 factorial ANOVAs were run on each of the variables (Table 4.6), and the main effect of gender on the MIR scores was statistically significant on each variable (see Table 4.6); but that was not true for any of the other main effects on the variables. Finally, there was no statistically significant difference in the MIR scores between any of the variables (Table 4.7). Note that there

was a disordinal interaction (Figure 4.1) between gender and ethnicity variables, $F(1,578) = .001$, $p = .10$, which was not statistically significant.

Table 4.5

Means and Standard Deviations for Mature Interpersonal Relationship (MIR) Status of First-Year Engineering Students

Variables	Residential Learning Community (RLC)			Traditional Residential Environment		
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Gender						
Female	53.42	7.79	86	51.72	7.62	121
Male	56.67	7.07	73	54.71	8.56	302
Ethnicity						
Underrepresented	54.36	11.01	34	54.19	9.76	84
White or Caucasian	55.06	6.45	125	53.78	7.92	339
First-Generation Status						
First Generation	53.43	5.37	20	53.98	9.46	54
Not First Generation	55.12	7.88	139	53.84	8.14	369
Extracurricular Involvement						
50% or more of the time	54.17	8.67	78	53.85	8.66	316
Less than 50% of the time	55.62	6.42	81	53.88	7.20	107

Table 4.6

Two-Way Analyses of Variance (ANOVA) Results for Main Effects for the Mature Interpersonal Relationship (MIR) status for Gender (G), First-Generation (FG) Status, Ethnicity (E), Extracurricular Involvement (EI), and Residential-Learning-Community (RLC) Involvement

Variable	df	MS	F	<i>p</i>	η^2
Main Effects of Gender (G) With					
Ethnicity	1	961.100	14.860	0.000	0.025
First-Generation Status	1	399.500	6.160	0.010	0.011
Extracurricular Involvement (EI)	1	996.190	15.400	0.000	0.026
Residential Learning Community (RLC) Involvement	1	1055.190	16.410	0.000	0.028
Main Effects of First-Generation (FG) Status With					
Gender	1	11.360	0.180	0.700	0.000
Ethnicity	1	29.250	0.440	0.510	0.001
EI	1	26.270	0.400	0.530	0.001
RLC Involvement	1	31.010	0.470	0.500	0.001
Main Effects of Ethnicity (E) With					
Gender	1	0.056	0.001	0.976	0.000
First-Generation Status	1	17.100	0.260	0.612	0.000
EI	1	2.350	0.040	0.851	0.000
RLC Involvement	1	1.585	0.020	0.877	0.000
Main Effects of Extracurricular Involvement (EI) With					
Gender	1	43.340	0.670	0.413	0.001
First-Generation Status	1	0.004	0.000	0.993	0.000
Ethnicity	1	45.510	0.680	0.408	0.001
RLC Involvement	1	58.180	0.879	0.349	0.002
Main Effects of RLC With					
Gender	1	360.390	5.600	0.018	0.010
First-Generation Status	1	6.770	0.102	0.749	0.000
Ethnicity	1	40.380	0.609	0.435	0.001
RLC Involvement	1	112.340	1.690	0.193	0.003

Note. Bold = $p < .05$

Table 4.7

Two-Way Analyses of Variance (ANOVA) Results for Interaction Effects on the Mature Interpersonal Relationship status (MIR) for Gender (G), First-Generation (FG) Status, Ethnicity (E), Extracurricular Involvement (EI), and Residential-Learning-Community (RLC) Involvement

Variable	df	MS	F	p	η^2
Gender (G)					
G x E	1	101.800	1.570	0.21	0.003
G x FG	1	0.070	0.001	0.10	0.001
G x EI	1	50.510	0.800	0.40	0.001
G x RLC	1	1.870	0.030	0.90	0.000
First-Generation Status (FG)					
FG x E	1	88.160	1.330	0.25	0.002
FG x EI	1	38.090	0.600	0.45	0.001
FG X RLC	1	42.980	0.650	0.42	0.001
Ethnicity					
E x EI	1	0.312	0.010	0.95	0.000
E x RLC	1	23.700	0.360	0.60	0.001
Extracurricular Involvement (EI)					
EI x RLC	1	52.760	0.800	0.40	0.001

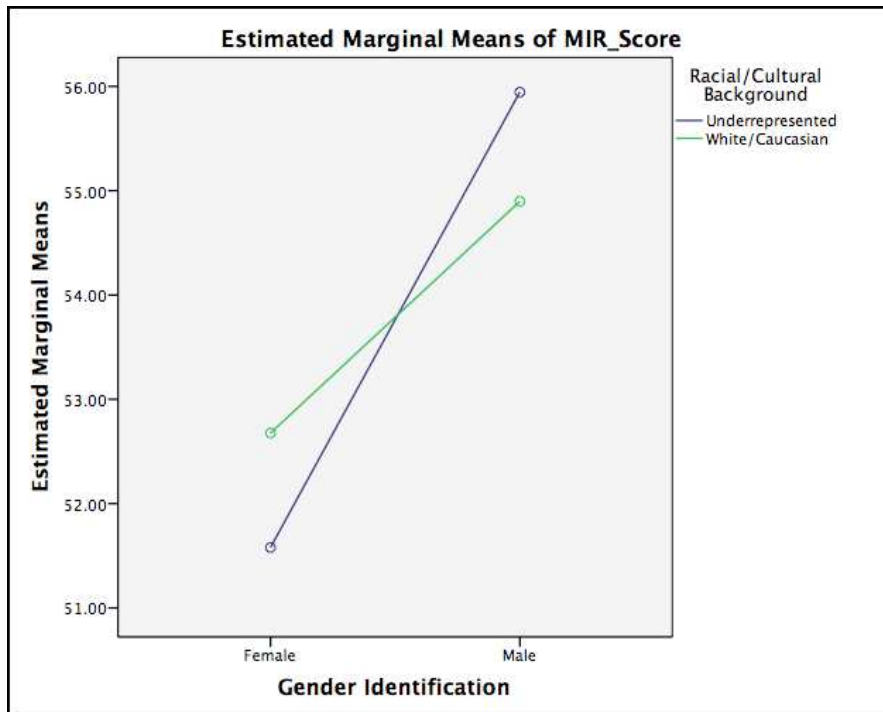


Figure 4.1. MIR score—gender and ethnicity interaction.

Research Question 2

The second research question was “How well does the combination of first-generation status, gender, ethnicity, RLC involvement, and extracurricular involvement predict scores for the status of MIR development?” Multiple regression was used on the data to determine the best linear combination of gender, ethnicity, first-generation status, aggregate extracurricular involvement, and RLC involvement in predicting the MIR scores. Table 4.8 shows the means, standard deviations, and intercorrelations among these variables. Gender ($F(5, 576) = 4.20, p < .001$) and RLC involvement ($F(5, 576)=4.20, p<=.030$) were the only variables that significantly predicted the MIR score; gender and RLC involvement also were correlated. Therefore, since gender and RLC involvement had the higher correlation value, all other variables were removed from the model. The resulting model was analyzed, and it was statistically significantly correlated ($p < .001, F = 10.24, R = .034, R^2 = .031$). The adjusted R-squared value was .3. This value indicates that 3% of the variance in MIR status scores was explained by the model. According to Cohen (1988), this outcome reflects a small or smaller-than-typical effect size. The beta weights represented in Table 4.9 suggest that gender and RLC involvement contributed most to predicting MIRs.

Table 4.8

Means, Standard Deviations, and Intercorrelations for MIR Status Scores and Predictor Variables

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5
MIR Score	54.15	8.13	0.16	-0.01	0.02	-0.04	0.06
Predictor Variable							
1.Gender	1.64	0.47	–	0.04	-0.03	0.02	0.24
2.Ethnicity	1.79	0.40	0.04	–	0.22	-0.04	0.02
3.First-Generation Status	1.87	0.33	-0.01	0.22	–	-0.07	0.00
4.Extracurricular Involvement (EI)	1.67	0.46	-0.04	-0.04	-0.07	–	0.24
5.RLC Involvement	1.67	0.46	0.24	0.02	0.00	0.24	–

Note. Bold = $p < .05$

Table 4.9

Simultaneous Multiple Regression Analysis Summary for Gender, Ethnicity, First-Generation Status, Extracurricular Involvement (EI), and Residential-Learning-Community (RLC) Involvement in Predicting the MIR Status Score

Variables	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Gender	3.08	0.72	0.18	4.29	0.001
Ethnicity	-0.33	0.85	-	-	0.70
First-Generation Status	0.52	1.03	0.02	0.38	0.61
Extracurricular Involvement (EI)	-0.38	0.74	0.02	0.51	0.60
Residential-Learning-Community (RLC) Involvement	-1.73	0.79	0.01	2.18	0.02

Note. Adjusted R-squared = .031; $F(2, 579) = 10.243$; $p < .001$

Additional analysis was conducted to see whether gender and RLC involvement were statistically independent. To investigate whether males and females differed on involvement with a RLC, a chi-square test was conducted. The assumptions were checked, and they were met. Table 4.10 shows the Pearson chi-square results, which indicated that females were significantly different from males in terms of whether or not they had an involvement with a RLC ($X^2 = 32.75, df = 1, N = 582, p = .001$). The effect size in this case was in the small to medium range ($\phi = .24$) compared to what, according to Cohen (1988), is typical in the behavioral sciences.

Table 4.10

Chi-Square Analysis of Prevalence of Residential-Learning-Community (RLC) Involvement Among Males and Females

Variables	<i>n</i>	<i>Males</i>	<i>Females</i>	X^2	<i>p</i>
RLC Involvement	-	-	-	32.75	0.001
Yes	159	73	86	-	-
No	423	302	121	-	-
Totals	582	375	207	-	-

Phase 2 Results

The focus of the second phase was to understand, more fully, the lived experience of those who resided either in RLCs or in traditional residential environments, specifically in relation to their MIRs. The results will be discussed using a template approach, applying the theoretical framework from Chickering’s theory of identity development (Chickering & Reisser, 1993), and specifically the description of MIRs. Next, the focus groups were then reanalyzed for additional elements using an emergent-analysis process applied during the inductive coding.

Research Question 3

The third research question was “How do students who participate in RLCs and traditional residential environments express their lived experiences relating to developing MIR skills?” To answer this question, students who completed the survey in March of 2015 were invited to participate in one of two focus groups, depending upon whether they resided in a RLC or a traditional learning community. Twelve students attended focus groups (See Table 4.11 for attributes of these students). Eight students from the RLCs had confirmed, but only seven

Table 4.11

Demographics Data on Gender, Ethnicity, and Residential Community Type

Participant	Gender	Ethnicity	Residential Community Type
“Mary”	Female	Underrepresented	Residential Learning Community (RLC)
“Christina”	Female	White or Caucasian	RLC
“Heather”	Female	White or Caucasian	RLC
“Joe”	Male	White or Caucasian	RLC
“Michael”	Male	White or Caucasian	RLC
“Ryan”	Male	White or Caucasian	RLC
“Matt”	Male	White or Caucasian	RLC
“Maria”	Female	Underrepresented	Traditional Residential Environment
“Sue”	Female	White or Caucasian	Traditional Residential Environment
“Elizabeth”	Female	Underrepresented	Traditional Residential Environment
“James”	Male	Underrepresented	Traditional Residential Environment
“David”	Male	Underrepresented	Traditional Residential Environment

actually attended. Six students from the traditional learning community had confirmed, but only five participated. Additionally, based on the results of Phase 1 and using purposeful sampling techniques, the researcher ensured there was a suitable representation of female students in each of the two groups in order to have a better overall basis for understanding lived experiences. The names of the students as they appear in this document are pseudonyms.

Template Themes

The focus-groups discussions were recorded and transcribed into text. Once in this form, the text was coded using NVIVO software. The theoretical framework for this study is based upon Chickering's theory of identity development (Chickering & Reisser, 1993) and his description of MIRs. With Chickering's concept of the MIRs as a lens, the subconstructs of *peer relationships* and *tolerance* were applied during the deductive coding to enable a more specific understanding of the student experience and establish the MIR status.

To begin to understand the MIR status in residential students, one must look at how peer relationships play a role in their development (Winston et al., 1999). Chickering's theory of identity development (1993) suggested that peer relationships were one contributing factor by which students distinguish between friends and acquaintances. Generally, relationships with peers are open and honest, and can survive differences in activities, beliefs, and values (Chickering & Reisser, 1993). To delve more wholly into the subconstruct of peer relationships, the researcher asked specific questions of each group about participants' experiences with their peers, how relationships developed over the academic year, and what aspects of their living environment and experience contributed to the development of their relationships with peers. They were given a forum in which they were encouraged to speak openly about their overall experience with peers (see Appendix C).

Commonly, the subconstruct of tolerance plays a role in the status of MIRs (Winston et al., 1999). As conceptualized by Chickering (1993), the theoretical framework used in this study illustrates that tolerance affects an individual's MIR status in terms of one having respect for and acceptance of those of different backgrounds, beliefs, cultures, races, lifestyles, and appearances (Chickering & Reisser, 1993). As such, specific questions were given to each focus group regarding participants' lived experiences, with a focus on tolerance in their living environments to guide the conversation (see Appendix C).

Peer relationships: Traditional residential environment. Generally, most students felt comfortable and did not hesitate to share their experiences related to their peer relationships. It was clear from the transcription that students attributed many of their peer relationships to the small size of the university community. Many students commented about the campus size, especially in comparison to other engineering schools in the area, in relation to their comfort with peers and their ability to recognize students from their communities across campus. Although many of the participants' comments seem to indicate a surface-level relationship with some peers, they also noted the small campus population provided the added benefit that they were able to get to know upper-class students, as well:

Sue: I think the size of the campus has contributed greatly to my interpersonal relationships. Just because it makes it easy. Like, walking to class, I will recognize all kinds of people.

David: I think the campus size itself is one of the largest contributing factors [to peer relationships] because there are people that you will see in your class that you recognize and they recognize you. You may not know their name but you still go, "Hey, how's it going?" type of thing. And so, even though it's not the fact that you have the most personal relationship with them, you still kind of have those connections just because there are so few people as compared to a larger school.

Elizabeth: I can agree that with a small school, I may not have a very strong personal relationship. Like, if I'm having a bad day, I'm not gonna turn to this person in math class, and be like, "God, I'm having this terrible day," and start crying or something. I

mean, I'd say, "Hi"; "Oh, it's raining,"... I don't know, something like that. You will recognize people but I don't always feel, like I cross that barrier into, um, more of a personal relationship.

James: It's really nice having a smaller campus because I have some friends that are first-years. A lot of my friends are first-years but I also have friends that are upperclassmen. But it's nice because you're just walking to class and then all of a sudden, two upperclassmen come up, "Hey, what's up?" and just talk. You walk to class together and then you guys split up. So, you get to have more relationships with people that are older than you, even though that you might not be in the same classes.

Additionally, some of the participants in the focus group found that having a common academic curriculum helped in the development of peer relationships. A common bond over surviving a long night of homework or the consistency of seeing each other in the same courses were noted as factors in friendships:

Maria: just taking the common-core classes has really helped me get to know people, especially the freshmen. Because again, we do not, or we originally did not, know very many people coming in here. So we go to class, we look at each other, "This sucks." "Wow, I think this sucks too." Then you bond over struggling over homework. I think that's really how we make a lot of friends.

Sue: I just realized, like, we were becoming really good friends because it was past surface level, I hate that, I hate this class. I am from here, it just, developed to personal stuff. And I realize those conversations only happen, late at night.

Elizabeth: But then if you're here, you know there's a good number of people also doing physics homework that late

When asked the question "How would you describe your overall interpersonal relationships experiences with students?" most students felt as though their experiences were positive, attributing the success of their relationships to their Resident Assistant (RA), the physicality of their environment and other co-curricular programming:

Sue: So, I had good quality and quantity of peer relationships, especially within my building. I got really lucky with my RA; not only is she the person who's supposed to make us feel safe on our floor, but she's also a really good friend to all of us. Additionally, she has made our floor a cohesive group, and so I have a strong friend group just on my floor alone.

James: Our floor... is really a tight-knit group. We're all friends there, and I think that's just because our RA was like, "Hey, let's all go do something," like the first week of school; and so we're like, "Well, I don't know anyone, so might as well." And then it kind of took off from there. Now pretty much every person I know, everyone on our floor and the community, is tight. Maybe not all of them are, like, best friends, but they're pretty much all friends.

Elizabeth: My RA has done wonders in terms of trying to get us all together. There's a girl on my floor who really enjoys crafting; and so you walk onto my floor, you'd be like, "Wow, your RA's awesome!" But it's actually just this girl who just loves crafting... the community room's really important because, on my floor there's a little area with a little couch, and my RA will do things in this area.

David: My floor is very tightly knit within the suites. The suites style actually helped us all get to know each other at first because we did have a common area to come and kind of sit around, especially when we didn't know anyone. Being in the suite style, it really helped I think.

Maria: So, I have a quite a few friends here but I did not make any of them through my residence hall. I really do not know people on my floor. I see new people every day on there. Every time I go back to my room I'm like, "Wow, when did you get here?" I made friends by joining groups on campus. Like, I sing and I am in two different singing groups here on campus.

When shifting to a more personal question, such as "Can you tell me about your most meaningful relationship you have within your residential community?," a lot of the students identified the roommate relationship as one of their more meaningful. Some participants had met their assigned roommate before moving in, which, they noted, contributed to the development of the relationship. Others, in contrast, pointed out that the peers they connected with on a deeper level were the ones they had more meaningful relationships with:

Sue: I think my roommate's my best friend on campus. I am really lucky. I met her in February, so I had met her once before I came to campus at a SWE [Society of Women in Engineering] event on campus through the admissions office.

Maria: My roommate and I are the same person.

David: Well, for me, it is my roommate, too; but I have the opposite, where I knew my roommate for like 3 or 4 years before I came in. And we were already pretty much best friends to the point that when we just got here and actually started living with each other.

Elizabeth: I would say the most meaningful relationships are the ones that get past let-us-just-complain-about-homework kind of thing, like the ones that you end up talking about more in-depth things. What ended up happening actually is, my Nature and Human Values class last semester, after certain discussions or certain lectures, I'd get really heated and I'd come back to my dorm, and I'd be ranting and being all upset about things; and then the people who would be able to sustain my conversation or be able to contribute, "I felt that same exasperation," I was able to make more meaningful interpersonal relationships.

Peer relationships: Residential learning communities. Generally, most students felt comfortable talking about their experiences that related to their interpersonal relationships; again, they did not hesitate to share their lived experiences with the researcher and the other focus-group participants. Overall, the experiences participants mentioned in the focus group implied that RLCs impacted students' peer relationships in a positive manner:

Matt: I think the theme-learning community I'm in; it just adds a nice variety to school. It gives distraction from just, straight-up engineering all day every day, and there is so much to do on the floor. You can do other things; you can talk to other people that have other interests. There are other activities to do—we go on floor trips, and it just adds variety to your life here.

Heather: I'm very glad that I applied now because I've met so many amazing people and have had so many great experiences, made so many great friends that I built true relationships with, some really great women.

Some participants found that preorientation events organized and facilitated through the RLCs positively impacted their peer relationships, while others found that not having a preorientation event hindered their success in building peer relationships as quickly and readily:

Michael: I think I personally have good peer relationships with all the people on my floor. My best friends are all people that live on the floor, and a lot of them were made on the wild trip, which is a backpacking trip that the Adventure Leadership Community (ALC) put on before the school year started. There was a lot of trust and relationships that were built on this trip. You felt a sense of connection on the trip.

Mary: Meeting people during the summer in the Challenge program and building those relationships, and coming in knowing that you are not alone, that is nice. In addition, a program that has been around for a while so it is also that same empathy with other students, where it is like past people who have been through the program understand

what you are going through. This program makes us feel like a big family. I have felt like I have a lot of support while living in theme learning community.

Matt: The first semester we did not have a preorientation event. Definitely, during the second semester I have a much deeper relationship with people on my floor than I did the first semester because it just took that time for me to get used to living in this community.

Community-service opportunities provided residents of specific learning communities the chance to build and grow peer relationships. Likewise, planned activities or merely being grouped with peers with common interests (e.g., outdoors, leadership, women in engineering) allowed for students with similar interest to build peer relationships. Sharing in these common experiences, whether through serving together or participating in activities allow students to interact with peers in a way that promoted interpersonal interactions:

Joe: I think that the experience within X Leadership Community that has had a significant impact was serving at a woman's shelter this past year with a variety of the people on my floor.

Christina: We got to make great connections through serving, and that is what I love to do best.

Christina: I just think there are more similarities between us on our floor so we have something to connect with others right away on.

Joe: My relationships in in the theme learning community tend to be more centered on athletic things. This is where we kind of find common ground, and so that is usually how we go about and building relationships.

Matt: Activities on our floor really helped, and a lot of those did not happen until well after first semester started. Those activities were musicals; we have done backstage tours of the Performing Arts Center, community service, and a few more things. With those types of activities, that probably definitely accelerated the process... Being in a theme learning community was helpful to have not only your friends in class but a strong community on your floor to help with you feeling like you had a good group of supportive friends with similar interests.

Some RLCs had residents residing on multiple floors within the same building. The ability to build peer relationships with peers living on other floors had a building-wide impact as

residents got to know other people on different floors, both within and outside of their own personal RLC:

Mary: The Athleticism & Wellness community is on multiple floors; we get to meet other people outside of our main living floors, and we share the same likes, interests, and stuff. So we built relationships across the building.

Additionally, some participants in the focus group found that having a common academic curriculum helped in the development of peer relationships. Participants noted that a common bond over surviving a long night of homework, or having a network of go-to peers for homework help or the mutual understanding and respect that comes from shared courses were factors in friendships:

Christina: Sometimes the way we bond with people studying because we'll see them late and we'll be struggling on something, knowing they are studying the same thing. We'll just sit there and have a pal instead of standing at that point, just because you're like, "I've reached a point I just need to talk to somebody," and you know you have somebody on your floor that can help.

Mary: I just feel like our whole campus has like a mutual empathy for everyone due how we are all studying the same things.

Joe: We form relationships differently here. We do not have time for, you know, drinking or investing into parties and stuff. So I feel like comparatively, the school is more focused on engineering and so our relationships are more focused on getting things done academically.

Heather: Peer pressure around studying and with the same experience definitely affects that kind of a relationship we have with each other here.

Christina: So at this school where there are not a lot of different majors, everyone is doing similar strenuous workloads, it is easier to understand what the other person is going through.

Students within the RLCs identified the size of the institution and the small-community feel as factors that impacted the building of peer relationships:

Mary: I also think the size difference from this school has a significant impact on my peer relationships.

Ryan: Here you get to know your friends and faculty so much more than at a larger school.

One participant in the focus group noted that his RA served as the most meaningful relationship:

Ryan: I'm going to say my most meaningful experience that I've had is with my RA. He is, really cool, really understanding. One of the best people I have met since coming to this school.

Tolerance: Traditional residential environment. Participants noted specific lived experiences that had allowed them to speak more openly about their interactions with others, and thus their ability to accept differences and have tolerance for others. However, some students felt that their community lacked diversity within their living environment and on campus in general, which suggests an impact on the subconstruct of development of tolerance for others:

Sue: The experience that sticks out greatest in my mind is, through my CSM101 class I became friends with a Saudi Arabian student. And so every once in a while we will meet for coffee and he'll just tell me about his life. His experience with this school is a lot different from mine. He's already under contract from the company. And that company's giving him different rules that he has to be following right now, like, he can't date, he can't get a job on campus, and he has to keep a certain GPA or else he's going to lose his job in the future.

Elizabeth: This school feels very small to me. My high school was very diverse, and we had the highest drop out rate, the highest teen pregnancy rate, and the lowest average GPA. And so, it's very different to be around people who are motivated, and also it's a very, white school.

David: At least for me, culturally wise, since I come from a different culture, kind of two different cultures—I have American and Indian—I was not too shocked. I was surprised about how little diversity there was within the culture here.

Elizabeth: I've had to explain to a lot of people, within my community, the difference between Asian and Asian American. I was hanging out with some friends one day, and then a few of them stated, "You know, I mean you look like my Asian friends but you have the mentality of my white friends." I had to explain to her that I was Asian American.

Moreover, some students identified personal struggles regarding the lack of tolerance within their community, or the lack of opportunities to interact with diverse populations, which thus had the potential to negatively impact tolerance development:

Maria: everyone I looked at is white. I looked very, very tan in comparison and I always get that question, “Oh, where are you from?” And it didn’t help that I was born in Japan but I’m not Japanese. So it was just really difficult trying to explain myself. I thought I wouldn’t have to because we’re at an engineering school, and I assumed that people would be a little less ignorant about that sort of thing, but apparently not.

Sue: I think I’m a really open-minded person, who can adapt really easily, to different beliefs and cultures; but I think the lack of diversity at this school, may hinder me a little bit, because I may not be as well prepared for the different beliefs as I think that I am capable of.

Tolerance: Residential learning communities. Students within the RLCs observed opportunities for understanding others within their communities; however, some participants took issue with the word *tolerance* when asked the question “Do you think students at the institution are developing a tolerance for other students who are different from their culture or background, beliefs, and approaches?”:

Mary: I do not think *tolerance* is the term ... I would say, from my experiences, a lot of people are interested if you have different experiences and not a tolerance for others.

Heather: I would agree; I do not think *tolerance* is the right word. I think that *understanding* was a better word for that.

Although there was not as much ethnic diversity among the participants for this specific focus group, the residents still seemed to think they had an appreciation for others. As illustrated in some of the responses below, the idea of tolerance extended beyond dealing with ethnic diversity, to a tolerance and acceptance for leadership styles, family beliefs, and even music preferences. Participants noted that their experiences in the residential communities had a positive impact on their abilities to see other viewpoints while still having a common bond of interests:

Joe: When you live in a theme learning community, you have similar mindsets. However, within those mindsets you can even have people who believe differently. And I don't know if I've had much experience personally with seeing tolerance of other people, but I know there's different leadership styles that I have had exposure to.

Heather: I think that some people are starting to have openness to approaching new things and new ways while being a part of my community, but it is hard coming from home where you are so confined to what your parents believe and what they want you to believe.

Joe: The resident assistant on our floor put on a karaoke night, and we invited the international student council to come and share their music with us. A lot of the international students sang some of their songs and it was just really great to hear them sing and start to have an appreciation for other types of backgrounds and cultures.

Michael: I think there is definitely an openness and acceptance because a lot of things—a lot of things the adventure leadership community does—you have to make yourself more vulnerable for. This is not just physically but emotionally as well. This allows you see others differently but similarly as well.

Matt: I think this year, in my theme learning community, has given me confidence in a way that we're all engineers, we all have the same mindset, that even if we have different approaches, or beliefs, as long as you're just open with each other and ready to hear other people's ideas and their approaches, that that'll help you get through it. That will help you communicate across cultures.

Emergent Themes: Traditional Residential Environments

After the themes were coded using Chickering's theory of identity development (Chickering & Reisser, 1993), the focus groups were then reanalyzed for additional elements. This was done by again applying the inductive lens using an emergent analysis (Given, 2008), whereby common themes were identified in the data. Each focus group was analyzed separately for its own themes. Following are the themes identified for responses from participants in traditional residential environments.

Space creates community. The focus-group participants who lived within the traditional residential communities found that space within their own living environment had a positive

impact on their relationships. They identified open doors, common rooms, comfortable furniture, and proximity as aspects that added to community building:

James: There are two guys on our floor that have their room open, and it's slightly bigger than the rest of our rooms, and they just kind of opened that up, and so that's kind of the hangout room. So, you're bored, you go in there. They welcome you and you sit down. Other people come in, other people leave and go to class. It's just kind of a place to hang out with people.

David: My floor is very tightly knit within the suites. The suites style actually helped us all get to know each other at first because we did have a common area to come and kind of sit around; especially when we didn't know anyone, this started to build our relationships.

Elizabeth: The beginning of the year was an interesting experience, especially when you are tripled up and you are really forced to build relationships quickly. Then after we were all detripled, after the move, we had a close bond as a campus.

Conversely, participants noted that the lack of central social space on the floor negatively impacted their relationship-building experience:

Maria: Well, I think one thing that really negatively impacted with me making any friends is how the rooms are rearranged—just like one long hallway and there aren't any real community rooms. There is a study room but no one ever goes in there, except for me. In addition, we do not have, like, a central area to gather to. We do not have that opportunity to meet other people there, which is why I do not know anybody on my floor.

Elizabeth: Like you said, the community room is important because, on my floor, there is a little area with, like, a couch and my RA will do things and we get to know each other really well in this area.

Outside events and cocurricular programming create community. Participants noted on several occasions that life outside of the residential community led to a feeling of community. Participation in campus-wide organizations, such as in Greek life or other clubs, helped to create situations in which community was built for several participants.

Sue: For me, going to a sorority meeting every week has helped me become friends with a lot of people outside of the Res Life community, which otherwise I would never get to know. I would say that 80% of my friends are also first year, just like me. Also, through my sorority, I have gotten to become friends with seniors and juniors, and this has helped expand and deepen my relationships with other students.

Surface relationships affect peer relationships. Many participants mentioned that although the size and small feel of the community can contribute to the strength of peer relationships, there are just as many surface-level relationships. Participants said they may recognize their peers from around the community, but not necessarily know them on any more meaningful level; at times, they might not even know their peers' names:

James: I think the size of the campus has contributed greatly to my interpersonal relationships. Just because it makes it easy... like, walking to class, I will recognize all kinds of people but not really know their name.

Elizabeth: I am actually bad with faces with names so I do not always have that, like, "Oh, see you around"; but I can agree that, with a small school, I may not have a very strong, personal relationship but can recognize a lot of people.

David: You might not know everybody, but people start to know who's kind of around a little bit—"Oh, he looks familiar, she looks familiar"—but nothing too in depth with most people in my building.

Vulnerability creates relationships. Some residents found that being open and vulnerable with their peers was a contributing factor to the development of relationships in their living environments. Participants pointed out that letting their guard down, whether through being tired, doing something silly, or sharing raw emotions with peers led to feelings of support and more meaningful relationships from these experiences:

Sue: I think it does have a lot to do with, like, being sleepy. Like, your filter just kind of goes out the window, and you are going to talk about things that take the relationship to a deeper level.

Maria: Embarrassing yourself is such a good icebreaker. I remember when I was actually trying to talk to people on my floor, and my roommate and I went to talk to guys that were across the hall; and we're all sitting in the room and someone just does something embarrassing to get the relationship going.

Elizabeth: The day that we became close and I started to be really good friends with my roommate was, the day that I like broke down and cried in front of her.

Emergent Themes: Residential Learning Communities

As noted previously, common themes were identified with each focus group once the themes were coded. The themes identified for responses from participants in traditional residential environments follow.

Faculty involvement affects interpersonal interactions. A large portion of the focus-group participants explained that the fact that their learning community was assigned a “faculty friend” added to the overall success of the program. This arrangement also allowed them an additional opportunity to create interpersonal interactions with people outside of their peer group:

Christina: I’ve connected well with our faculty friend who’s in the graduate studies, which is really cool, because, like, if I have a question about that, or if I was ever concerned about issues related to school or life, I could go and speak with him.

Michael: He is one of the theoretical guys which I’m more interested in and I met within our theme learning community. I believe I would not have felt comfortable with him without him being a part of our community.

Matt: Our faculty member, we have got an interesting relationship with her. She is a lot of fun—she gets us. I think she is, like, the perfect faculty member for the Adventure Leadership Community because she’s all about having fun. She’s perfect at educating us but still letting us have good fun being adventurous. She has really brought our community together through programs and just being around.

Activities specifically created for the learning communities build relationships.

When prompted to describe the types of activities within the RLC, many of the participants spoke of the close relationships they had created in the 9 months they had been living there. Some communities had the advantage of having a preorientation trip, such as the Wild Trip, which positively impacted them, while others recognized events throughout the year that impacted their relationships:

Michael: My best friends are all people that live on the floor, and a lot of them I made on the Wild Trip, which is a backpacking trip that the ALC put on before the school year started.

Joe: I think that my best experience with the leadership community was serving at a woman's shelter together, and that really brought us closer together.

Christina: A community-service program really brought the community together.

Matt: Having good social events throughout the year just adds a nice variety to school. It gives distraction from just straight-up engineering, all day, every day. And there is other things you can do, and you can talk to other people that have similar and other interests.

Vulnerability creates relationships. Similarly to the participants in the traditional-residential-environment focus group, some residents of the RLCs also found that being open and vulnerable with their peers was a contributing factor to the development of relationships in their living environments. Participants pointed out that letting their guard down, whether through sharing something important about themselves, lending a listening ear and offering encouragement, or building trust with peers led to feelings of support and more meaningful relationships from these experiences:

Mary: One of the most meaningful relationships is a person I did not know quite well, but he was having a bad day, and I just gave him a hug; and then he needed to talk to me, and this was the first week of school, he came out to me. It was the comfort of being in the same community and having similar interests that initially brought us together to have a more meaningful relationship.

Michael: Yeah, I think there is definitely openness and acceptance because a lot of things—a lot of things we like to do has to do with making yourself more vulnerable for. This is not just physically but emotionally. I just have to completely trust them in the activities we are doing, such as trips or a rock-climbing outing.

Bonding over common stressors builds relationships. As the focus-group conversations progressed, a theme of bonding over common stressors emerged. Students described these stressors as their having similar struggles within the same type of classes and

homework, and the necessity of studying, making decisions about majors, and being held accountable to their peers for participating in class and study sessions.

Heather: At least for me, being in the visual and performing-arts community has been great because I know quite a few people who are choosing between an arts degree and engineering; so having that in common is really nice because the first semester here was really interesting, going from high school where you have lots of different classes and you have diversity in your classes, to just math and science. And it was really nice to have other people who were struggling with that difference in classes.

Joe: Being on the same floor with similar-minded people, you are also tied into the fact that you are doing the same homework and you need to work as a team. I do not think we would be very good friends if it were not for the fact that, like, we were studying so hard and we had that communal experience of pain and suffering.

Matt: So that was helpful to have, not only your friends in class, but, a strong community on your floor to help with you feeling like you had a good group of supportive friends. It is a lot harder; we cannot just skip class and not be called out for it.

Christina: The way we bond with people studying because we will see them late and we will be struggling on something together, more often due to the same class experiences.

Support through community. When asked the question “How does the gender gap impact your experience in forming relationships?,” participants conveyed a sense of support within both the residential community and the campus community. Some female students noted a positive experience and also feeling supported by other students of the same gender.

Christina: So, I think being in the theme learning communities has helped me to find support with other students that are like minded but are at a school where everyone understands what you’re going through. Especially when you have a challenging situation. I found both women to be caring, especially with a lot of guys on campus.

Mary: I also feel like being in a theme learning community, and going to an engineering school, and with older students that have been in our shoes, feels like our whole campus has like a mutual empathy and support for everyone, including being with our ladies that had similar struggles on campus.

Building more meaningful relationships through common interests. The participants’ overall perceptions were that the RLCs did affect how their relationships developed, some more positively than others. However, it became apparent with a review of the transcripts that the

focus-group participants spoke highly of the impact of the RLCs. Students saw participation in such communities as an opportunity to form deeper relationships:

Matt: I definitely have a much deeper relationship with people on my floor than others outside of my community did in their first semester due to the great community we had right away.

Michael: I think I definitely have a lot of relationships inside of the community. They did not take that long to form as we had a lot in common within the community. Living with people it is, just, it is almost instant that you become friends. You bond.

Heather: I mean, even within a group of people who have similar interests, you meet people from lots of different backgrounds. And because we were forced to be together so much so early, getting to know people's backgrounds happened really quickly.

Building design creates relationships. Like the focus-group participants who lived within the traditional communities, the participants living within the RLCs also found that space within their own living environment had a positive impact on their relationships. They too identified open doors, common rooms, comfortable furniture, and proximity as aspects that added to the community-building relationships with each other:

Joe: Living in Elm Hall, we have a lot of communication with the people on our floor; but as compared to the traditional halls, where I know doors are open all the time, they get to know the people on your [*sic*] floor very well.

Mary: I feel like having a themed learning community to a dorm like Elm where, you know, people do not get the chance to communicate because it is a bigger building. The doors are spring-loaded so they shut themselves. The community is not as open or tight-close of a community as a traditional hall built where everyone is in the same hallway. And [we] are very close to each other as a whole. My floor was close, but the building was not as much.

Ryan: We have doorstops, and I think it actually helps us talk and build relationships when our door is left open.

Christina: What we should have done is have all the doors propped open, so that is the expectation you want and that's how you visualize the space, like with doors open. So if doors are open, you are more willing to build those relationships with others on the floor.

Research Question 4

The fourth research question was “Are there logical connections between the qualitative analysis of the student focus groups and the results from the quantitative phase of the study?” In an attempt to answer this research question, a sequential explanatory design was used to further examine both the quantitative and qualitative data gathered. Using both quantitative and qualitative data together helped the researcher to understand the unforeseen results in more detail (Creswell & Plano-Clark, 2011). Based on the unanticipated data results from the quantitative phase of the study, it was clear that there was an advantage to performing a sequential explanatory design to enable a fuller understanding of the results from the initial survey. The results of the learning-community focus group indicated that the participants believed their lived experiences within RLCs, did, in fact, support the development of their relationships. Several RLC participants’ comments indicated a deeper level of peer relationships, whereas participants within the traditional-residential-environment focus group explained that some of their experiences led to more surface-level interactions.

Although some aspects of the initial survey results were unexpected, data also were gathered that were more in line with initial assumptions. The quantitative results illustrated that male students had higher MIR scores than female students. The quantitative data informed the researcher enough prior to the focus groups to help him ensure a diversity of gender in each of the focus groups. Additionally, he used the quantitative data to shape the prepared focus-group research questions. Those questions were used to assist in clarifying why the statistical data indicated gender as an indicator in higher MRI scores and, as such, what experiences students might benefit from in their residential experience to ensure continuous development in their MIR status.

Past research (Humphreys, 2010; Owens, 2010) affirmed the importance of residential environments, specifically RLCs, and illustrated evidence of increased psychosocial development for those who participated in those experiences. Qualitative data collected in this research also supported this idea: “I think being in the theme learning communities has helped me to find support with other students and helped with my development as a person” (Heather, personal communication, April 13, 2015).

Although the participants within the focus groups provided evidence through examples of their own personal experience that suggested otherwise, the findings from the quantitative portion of the study provided some statistical significance that male’s scores are higher than female scores. It should be noted that, although there was no statistical significance through the quantitative data regarding overall increase of MIR scores of students living in learning communities, there was a correlation between gender and RLCs—specifically, women in RLCs had a higher status MIR score than those in a traditional residential environment, which coincides with data gathered during the RLC focus group.

In addition to a lack of statistical significance regarding the effects of living environments, whether traditional or residential learning, on MRI scores, there was also a lack of initial data gathered regarding the impact of extracurricular activities on MIR scores. However, there were comments from participants in both focus groups indicating that extracurricular activities, both those within the living environment and cocurricular activities, had an impact on participants’ perceived interpersonal relationships. Moreover, there was no statistical significance and nothing noted within the focus groups that alluded to first-generation status or ethnicity having a significance or influence on the lived experiences of the students.

Finally, to address the issue of tolerance, students were asked a list of questions that addressed the area of appreciating differences in others. Those participants in traditional residential environments shared that many of their experiences were not positive in terms of their feeling like they were being accepted as underrepresented students.

Summary

The second phase of data collection focused on the lived experiences of residents of both RLCs and traditional residential environments, specifically in relation to their MIRs. Students who also participated in the online survey were invited to participate in focus groups based on their living environment (learning community or traditional residential). For each focus group, conversations were recorded, transcribed, and coded, and the theoretical framework was applied to the data using the subconstructs of peer relationships and tolerance. The quantitative phase showed little significance in data other than significant differences related to gender. Additionally, the qualitative phase supported the findings from previous research that students who live within RLCs have experiences that provide those students with opportunities for MIRs.

CHAPTER 5: DISCUSSION

This chapter includes a summary of the current study, a discussion regarding the findings from the study, and recommendations for practice and future research. The discussion includes the review of the study findings and identifies the similarities and differences of those findings when compared to previous research. The recommendation for practice presents the implications for those working in residential life on college campuses. The final section includes recommendations for future research related to mature interpersonal relationships (MIRs) and the population at science, technology, engineering, and mathematics (STEM) institutions.

Summary of Research Study

The purpose of this study was to investigate the differences in the MIR development status of first-year engineering students who elected to live within residential learning communities (RLCs) compared to the MIR development status of those students who lived within a traditional residential environment at a STEM institution. The following research questions were created to address the purpose of the study and direct the data analysis:

- (a) Is there a significant difference in or interaction between the scores for the status of the mature interpersonal relationship (MIR) development of first-year engineering students, across a variety of variables (gender, first-generation status, ethnicity, and extracurricular involvement), among those students who elect to live within residential learning communities (RLCs) and the scores of those students who live within a traditional residential environment (as measured by the combined scores of the Student Development Task & Lifestyle Assessment [SDTLA])?

- (b) How well does the combination of first-generation status, gender, ethnicity, RLC involvement, and extracurricular involvement predict scores for the status of MIR development?
- (c) How do students who participate in RLCs and traditional residential environments express their lived experiences relating to developing MIR skills?
- (d) Are there logical connections between the qualitative analysis of the student focus groups and the results from the quantitative phase of the study?

Research Question 1

To review, research question 1 served to examine whether a significant difference existed between the scores for the status of the MIR development of first-year engineering students who elected to live within RLCs and the scores of those students who lived within a traditional residential environment. The MIR status was determined based on a survey that took into account a variety of variables (gender, first-generation status, ethnicity, and extracurricular involvement). For this study, the variable of gender revealed statistical significance (see Table 4.6). The mean MIR score for females was 52.43 and 55.09 for males. The eta squared, an index of association, was low, ranging from .011 to .028; these values indicate that from 1.1% to 2.8% of students' MIR status could be predicted by gender. A comparison of the means was conducted between the collected data and the normative data provided in the SDTLA technical manual for each of the tasks and scale and based on the developer's normative samples, an established mean of 50 for first year students was noted (Winston et al., 1999). Overall, this finding indicates that students at the institution studied scored a higher mean when compared to the normative sample.

This study was administered at a public STEM institution with approximately 4,150 undergraduate students. The institution is a highly selective university with no Bachelor of Arts degrees conferred, only Bachelor of Science. Admitted students in 2015 were of the top 10% of their graduating class, had an average high school GPA of 3.8 and an average ACT of 31. Additionally, students within a STEM institution have a tendency to have a strong desire and focus to be successful academics (Chen, 2009). For the first two years CSM, students follow a prescribed core curriculum, which intendeds to augment fundamental computational, analytical, and problem-solving skills. Additionally, first-year students are placed in an intensive structured core curriculum that allows most first-year students to take similar classes for the first two years of academic course work. Moreover, all first-year students are required to take a first-year success seminar (CSM 101) to support student transition, retention, success, development, and satisfaction. Like many STEM institutions, the school is predominately male with 30% of the undergraduate population identified as female. The school is also racially homogenous with 18.5% undergraduate population identified as a member of an underrepresented minority; an additional 8% are non-citizen, international students from 44 foreign countries.

The results did come as a surprise to the researcher because various psychosocial development theories (Chickering & Reisser, 1993; Gilligan, 1987; Humphreys, 2010; Owens, 2010; Straub 1987) have stated that women develop interpersonal relationships first before they move to other vectors. It has been argued that women at STEM institutions seek to master issues of MIRs (Seymour, 1995), in contrast to men, who tend to focus on developing autonomy before they move on to the establishment of other vectors. Seymour (1995) reported that women in the STEM fields have a much stronger affective orientation than males toward their education. According to Seymour, men approach their education from an instrumental perspective. For

example, they tend to value effective teaching methods and opportunities to excel in the classroom, and they enjoy competition.

The results from the current study, based on the MIR scores, suggest that the scores happen to reflect that men perceive, as though, they had stronger MIRs than women. It is yet to be determined why this discrepancy occurs, but some possible conjectures are that women could have entered into their first year at an overall lower MIR status than their male counterparts or women might have different personal priorities than men (e.g., women might focus on academic achievement, extracurricular involvement, establishment of their own sense of self) that take priority over developing MIRs

Additionally, there was a disordinal interaction in the current study between gender and ethnicity variables, which was not statistically significant. These results were inconsistent with the findings of some previous studies (Itzowitz & Petrie, 1986; Taub & McEwen, 1992) that suggested the MIRs of underrepresented students showed a statistically significant difference from those of white/Caucasian students based on the respective scores of each group.

Furthermore, the additional variable of first-generation status was not statistically significant. The current literature does not specifically address MIR status or development; thus, long-term research should be conducted to explore the MIR development of students with first-generation status within a STEM institution.

Finally, the aggregated scores in the current study for extracurricular involvement were not statistically significant, which again was unexpected given the existing literature by Foubert and Grainger (2006) regarding the impact of extracurricular involvement. These researchers investigated how the extent of varying levels of involvement in student clubs and organizations coincided with students' MIR development throughout their college career. The difference with

the present study's results and those of Foubert and Grainger is that their study was longitudinal (representing 4 years of the students' experiences), versus this study, which looked at only one year and the status of one vector of Chickering's (1993) psychosocial development. It should be noted the current study used an invalidated scale to measure the extracurricular-involvement results; thus more research should be done within this topic using a validated measure for extracurricular involvement.

Research Question 2

Research question 2 explored how well the combination of variables such as first-generation status, gender, ethnicity, RLC involvement, and extracurricular involvement predicted scores for the status of MIR development in engineering students. The results suggest that gender contributed most to predicting MIRs, and that RLC involvement contributed as a predictor, as well. The findings initially appear to indicate that first-year, males, regardless of residential living environment, had higher MIR status scores than females. Again, this result contradicts previous findings: As Reisser noted in "Revisiting the Seven Vectors" (1995), women, on issues of relationship, seek to "preserve the relationship" (p. 507). According to Chickering and Reisser (1993), women within the first year, typically, place a higher value on attempting to develop the relationships with peers and adult figures, whereas men within the first year, typically, value developing autonomy. Additional research using a pretest-posttest design is needed to determine more fully how women at STEM institutions develop relationships.

Additionally, the study results suggest that living within RLCs is related to MIR status. Students (both males and females) who elected to live within the RLC had higher mean MIR scores than those students who lived in the traditional residential environments. These results would indicate that those who self-select to live within RLCs already have a higher MIR status

score or more mature skills than those who have elected not to be involved. This finding could be due to the commonalities that these students start out with.

Research Question 3

The purpose of the third research question was to help provide a fuller understanding of how students articulate their actual lived experiences. Two separate focus groups, one of students who elected to live in traditional residential environments and the other of students who elected to live in RLCs, were conducted. Both template and emergent analyses were used for evaluating the responses to this question and will be discussed.

As RLC focus-group participants shared, their participation in a RLC may have positively impacted their ability to establish peer relationships. It is possible that sharing in common experiences such as community service and academic course work, or participation in shared activities, aided students in their ability to interact with peers in a way that promoted interpersonal interactions. Students ascribed the type of building to which they were assigned as another possible contributing factor to their development of peer relationships. Some of the RLCs were split into different floors within the residence hall, which provided the opportunity for students to interact with a greater number of their peers, whereas some residents within the traditional residential environments claimed to experience more surface-level relationships. Some participants said that they might recognize their peers from around the community but did not necessarily know them on any more meaningful level than basic recognition; at times, they might not even know their peers' names. These types of statements from some of the focus-group participants living in the traditional residential environment help to paint a picture of their lived experiences in the context of building peer relationships. Last, some participants within

both focus groups suggested that strong leadership within the residence hall, specifically by the Resident Assistants (RAs), played a role in creating opportunities for peer interactions.

The researcher used the second subconstruct of MIRs, tolerance, as a lens to help increase his understanding of the lived experiences of the focus-group participants. This part of the focus-group discussion offered some varied outcomes. Some participants seemed to take issue with the specific word *tolerance*, explaining that they thought it was too strong to describe some of their interactions. One participant shared her own experience, explaining that she experienced tolerance in ways that extended beyond ethnicity, including tolerance of leadership styles, beliefs, and even tastes in music. A few students seemed to have experiences that suggested a lack of tolerance from some other students in the residential environment. Some possible contributing factors that exist outside of the residential environment (i.e., personality, personal goals, and different developmental statuses) could be responsible for these experiences of some participants.

In acknowledgment of such varied experiences, Chickering and Reisser's research (1993) suggested that vectors proceed in a sequential fashion. Connelly (2014) conjectured that students' experiences during their first year within RLCs at STEM or polytechnic institutions were mixed, and included tolerance or an appreciation for others because of the various understandings of diverse populations that these students had brought to college from past lived experiences. The findings of the current study may be consistent with those earlier findings in that all the studies included factors that existed outside of the residential environment and that contributed to students' experiences.

The qualitative phase of this study also provided a variety of themes that emerged in the focus-group discussions. Some participants from both focus groups credited common space and

open doors on the floor as positive contributing factors to the development of their MIRs. The results are consistent with existing literature that asserted that the environment does play a contributing role in the MIR developmental outcomes and, likewise, that various spaces within the environment might affect psychosocial development (Strange & Banning, 2001).

A second major theme that multiple participants in the RLC environments mentioned was the effect of shared stressors and common academic loads. The participants saw these common experiences as opportunities to spend more time together by sharing in each other's vulnerability (to stressful academic situations), and growing in academic successes (or, as it may be, sharing in the disappointment of less successful academic situations). These results are similar to the findings of existing literature (Zhao & Kuh, 2004) that suggested that students who participated in a first-year RLC were positively connected, frequently interacting with their peers and with faculty members, and engaging in diversity-related activities.

An additional theme participants in the RLC focus group mentioned was faculty involvement. For them, faculty involvement outside of the classroom and, specifically, faculty visiting the living environments helped bridge the gap from academics to cocurricular experiences. This outcome supports the literature findings that peer and faculty interactions have a positive, direct impact on gains in student learning and development (Garrett & Zabriskie, 2003; Inkelas et al., 2006; Lacy, 1978; Pascarella & Terenzini, 2005; Pike, 1999).

Last, participation in extracurricular activities, whether as a part of the RLC programming or other cocurricular programming, was a contributing factor in how participants in the focus groups viewed their peer relationships. Extracurricular activities could be a contributing factor when it came to shaping MIRs, according to the comments many of the participants in both focus groups offered. RLCs specifically highlighted a variety of experiences

that provide opportunities for students to develop relationships throughout the year. These programs are unique and offered only to RLC residents, but they could be further expanded to impact more of the residential community as a whole.

In addition, students living in the traditional residential environments are provided with programming that is different from that for RLCs. Students within the traditional residential environments reported that participating in optional programming such as community service and other spontaneous events hosted by the residential staff aided in their MIR status. These findings are consistent with the literature (Pike, 1999; Terenzini, Pascarella et al., 1996) that suggested that students who lived in residence halls in which involvement in out-of-class activities was higher may have greater development in the area of MIRs.

Research Question 4

The fourth research question served to examine how the quantitative and qualitative data informed the purpose of this study. A sequential explanatory design was used “as a justification for combining qualitative and quantitative methods” (Creswell & Plano-Clark, 2011, p. 57) to help explain the results of the quantitative data. The quantitative data unexpectedly showed that the MIR score of male students had greater means than those of women.

The qualitative portion of the study revealed that, although there were different engineering majors throughout the residential communities, the students shared many of the same classes, which enabled them to also have a shared focus regarding their academic experiences. One can infer that the academic experience, along with the strong connection in similar interests among those in the residential environment, were factors in these students’ MIR statuses. Data from previous research suggests that, in the area of MIRs, both men and women in RLCs find support and develop relationships that involve trust and potentially “long-lasting

relationships” (Chickering & Resisser, 1993, p. 48). The findings within this study support the existing literature in the respect that, by bridging students’ academic life with their living environment, the combination of residential learning experiences and common curricula helps to create a supportive environment.

Additionally, based on the data collected from the focus groups specifically in the area of tolerance, the participants for each focus group (RLC and traditional residential environment) noted different lived experiences. Participants in the RLC focus group seemed less engaged when addressing issues of tolerance, whereas the participants from the traditional residential environment setting were more open and spoke more often about their lived experiences with tolerance. It is possible that the narrow, interest-based focus of RLCs contributed to those students’ lack of exposure to an environment that stimulated an appreciation of differences. However, there is no way to know the preexisting biases and intolerances of the participants; therefore, whether or not the living environment played a role in tolerance cannot be determined.

Limitations

Because the sample was drawn from a small, public, research STEM institution, the results of this study cannot be generalized to other types of institutions. Also, in the quantitative phase of the study, there was a potential risk of a nonresponse error (i.e., in the event of a low response rate, problems were caused by differences between those who responded and those who did not respond) (Dillman, 2000). Furthermore, because convenience sampling was used in the quantitative phase of the study, one cannot say with confidence that the sample was representative of the population (Creswell, 2013). Additionally, because of the interpretative nature of the qualitative research, one cannot generalize the findings.

Recommendations for Practice

The results of this study suggest limited recommendations for practice. Because there was a statistically significant difference in MIR status scores by gender, the sole recommendation is to ensure that Residence Life departments at STEM institutions offer adequate opportunities for women to engage in and develop their peer relationships. With the understanding that some women may not make it a priority or feel the need to participate in opportunities to engage in their development of peer relationships, residential departments should still make the effort to provide and monitor the opportunities for either all students or female students to participate in MIR development.

Recommendations for Future Research

As one of the only known studies that has examined the MIR status of first-year engineering students at a STEM institution, this study opens the possibilities for future research on how RLCs affect students' MIR status or development. The recommendations for research include (a) exploration of a related pretest-posttest design; (b) investigation of first-year engineering-student development, (c) women's experiences in RLCs at STEM institutions, and (d) refinement of the SDTLA instrument.

First, one might consider conducting a pretest/posttest-designed study that includes participants for a longer period during the first year for both the quantitative and qualitative phases. The purpose of such a study would be to investigate the differences between the status of MIR development in first-year engineering students who elected to live within RLCs and that of MIR development in those first-year engineering students who lived within a traditional residential environment. For instance, is there a significant difference between the MIR development of first-year engineering students among those students who elect to live within

RLCs and that of those students who live within a traditional residential environment?

Second, research could be conducted to examine the MIR development of engineering students and how this development might compare to students with other majors within STEM institutions. For example, these studies could examine the differences in first-year students involved in engineering majors compared to those students majoring in science, technology, and math. The data collected on such studies, while controlling the studies for various residential environments, could provide insight into the impact on MIR development of students who are in a specific type of major within a STEM institution.

Third, research could be done to examine the experiences of women at STEM institutions who participated in RLCs compared to those women who did not participate in the RLCs. The purpose would be to gain an understanding of what experiences were meaningful to each group as they pursued their degrees. These women might also be in their junior or senior years so they would have had time to reflect on how their experiences in their RLC have influenced their other experiences at their institution, and also their decision to remain at their institution. This data could be beneficial for understanding how women in the STEM fields make meaning of their experiences as underrepresented students and how, if at all, those experiences influence MIR status or development.

Finally, further research is needed in the area of refining the SDTLA instrument. Currently, the instrument investigates only housing environments in terms of students living in single-sex residence halls, coed residence halls, on-campus apartments, off-campus housing, fraternity/sorority houses, at home with parent, or at home with spouse (Winston, 1999). Comparing specific RLC types (e.g., women in STEM, engineering-specific settings, various

interest-based communities) may yield a greater understanding of the difference between the impacts on MIR development of a variety of RLCs.

Summary

This chapter has included a summary of the current study, a discussion regarding the findings from the study, recommendations for practice, and recommendations for future research. The discussion has reviewed the study findings, and identified the similarities and differences between those findings and prior research. The recommendations for practice present the implications for those working in residential life on college campuses. The final section has included recommendations for future research related to MIRs and also the population at STEM institutions. Overall, this study found that the MIR status of first-year engineering students differed between males and females, and the study provided a greater understanding of the lived experiences of those living in RLCs at one STEM institution.

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APPENDIX A: SURVEY INSTRUMENT

SDTLA: Mature Interpersonal Relationship Task

Added Demographic Questions:

1. Do you identify as the following:
 - a) Female
 - b) Male
 - c) Other (please specify) _____
 - d) Prefer not to answer
2. I am a first generation college student (neither your parents nor grandparents have a 4-year college degree).
 - a) Yes or No
3. What is your racial or cultural background?
 - a) Black or African American
 - b) Hispanic, Latino/a, or Mexican American
 - c) Asian American or Pacific Islander
 - d) Native American/People
 - e) White or Caucasian/European
 - f) Bi-racial or multiracial
 - g) Other (please specify)
 - h) Prefer not to answer
4. In which of the following residence hall environments do you reside?
 - a) Aspen
 - b) Elm Hall
 - c) Maple Hall
 - d) Traditional Hall (Morgan, Thomas, etc.)
 - e) Weaver Towers
5. How often do you attend programs held by your residence hall?
 - a) Always (100% of the time)
 - b) Very Often
 - c) Sometimes (50% of the time)
 - d) Rarely
 - e) Never
6. Are you currently a member of a Theme Learning Community?
 - a) Yes or No
7. If “yes” to the above, which Theme Learning Community do you belong to?
 - a) Adventure Leadership
 - b) Oredigger Leadership
 - c) Visual and Performing Arts
 - d) Athleticism and Wellness

8. Are you currently a member of an official Colorado School of Mines Engineering Club or Organization?
- Yes or No
 - If “yes,” please specify (Dropdown menu of all clubs/organizations)

Respond to the following items by marking

A = True

B = False

- ___ 1. It is important to me that I be liked by everyone.
- ___ 2. I would prefer not to room with someone who is from a culture or race different from mine.
- ___ 3. During the past 12 months, I have acquired a better understanding of what it feels like to be a member of another race.
- ___ 4. Within the past 12 months, I have undertaken an activity intended to improve my understanding of culturally/racially different people.
- ___ 5. I avoid discussing religion/spirituality with people who challenge my beliefs, because there is nothing that can change my mind about my beliefs.

Respond to the following statements by selecting the appropriate letter:

A = Never (almost never) true of me

B = Seldom true of me

C = Usually true of me

D = Always (almost always) true of me

- ___ 1. When I wish to be alone, I have difficulty communicating my desire to others in a way that doesn't hurt their feelings.
- ___ 2. Because of my friends' urgings, I get involved in things that are not in my best interest.
- ___ 3. It's more important to me that my friends approve of what I do than it is for me to do what I want.
- ___ 4. I find it difficult to accept some of the ways my close friends have changed over the past year.
- ___ 5. I don't socialize with people of whom my friends don't approve.
- ___ 6. I try to dress so that I will fit in with my friends.
- ___ 7. I'm annoyed when I hear people speaking in a language I don't understand.
- ___ 8. I avoid groups where I would be of the minority race.
- ___ 9. A person's sexual orientation is a crucial factor in determining whether I will attempt to develop a friendship with them.
- ___ 10. I try to avoid people who act in unconventional ways.
- ___ 11. Learning to live with students from cultural or racial backgrounds different from mine is an important part of a college education.
- ___ 12. I feel uncomfortable when I'm around persons whose sexual orientation is different from mine.

Respond to the statements below by selecting one of the following:

A = Never

B = Seldom

C = Sometimes

D = Often

- ___ 1. I wonder what my friends say about me behind my back.
- ___ 2. I dislike working in groups when there are a significant number of people who are from a race or culture that is different from mine.
- ___ 3. I have used my time in college to experiment with different ways of living or looking at the world.
- ___ 4. I express my disapproval when I hear others use racial or ethnic slurs or put-downs.
- ___ 5. In the past 6 months, I have gone out of my way to meet students who are culturally or racially different from me because I thought there were things I could learn from them.

Select the one best response from the alternatives provided.

- 1. After a friend and I have a heated argument, I will
 - a) Never (almost never) speak to him/her.
 - b) Seldom speak to him/her.
 - c) Usually speak to him/her.
 - d) Always speak to him/her.
 - e) I never have disagreements with friends.
- 2. When I have heated disagreements with friends about matters such as religion, politics, or philosophy, I ...
 - a) am likely to terminate the friendship.
 - b) am bothered by their failure to see my point of view but hide my feelings.
 - c) will express my disagreement, but will not discuss the issue.
 - d) will express my disagreement and am willing to discuss the issue.
 - e) don't talk about controversial matters.

Additional Section (but separate survey):

Please provide us with your information below to be entered into a random drawing for 1 of 10 gift cards for completing the survey.

Name:

Residence Hall:

Email Address:

Phone Number:

APPENDIX B: EMAIL TO PARTICIPANTS

Dear Participant,

My name is Brent Waller, and I am a researcher from Colorado State University in the Education Department. We are conducting a research study on interpersonal-relationship status and residence-hall environments. The title of our project is *Examining the Mature Interpersonal Relationship Status of First-Year Engineering Students Within Residential Learning Communities*. The Principal Investigator is Dr. Marlene Strathe, Education Department, and I am the CoPrincipal Investigator.

We would like you to take an anonymous online survey with an optional 45- to 60-minute focus-group interview. We are requesting that you attend the community meeting within the next month hosted by your resident assistant, who will provide you an opportunity to understand the study. If you would like to complete the study now, you may do so, or you can complete it at your community meeting. Participation will take approximately *10 minutes*. Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participation at any time without penalty.

We will not collect your name or personal identifiers. When we report and share the data with others, we will combine the data from all participants. Although there are no direct benefits to you, we hope to gain more knowledge about how various residence-hall environments meet the needs of our students; the study also will contribute to our understanding of how first-year engineering students develop interpersonal relationships. Please note that I will provide you with an opportunity to enter a raffle for one of 10 Amazon gift cards at the end of this survey.

Because of the reflective nature of some of the questions, there is a remote possibility that the questions may have minimal emotional impacts related to your current or past living environments, and you may have a need to know about some additional resources on campus; during and after the survey, you will be provided with a list of all these potential resources. Students are instructed to call the CoPrincipal Investigator with any questions or concerns. It is not possible to identify all potential risks in research procedures, but the researchers have taken reasonable safeguards to minimize any known and potential (but unknown) risks.

To indicate your consent to participate in this research and to continue on to the survey, please click here: <insert link>.

If you have any questions about the research, please contact Brent Waller at 303-273-3046, bwaller@mines.edu, or Dr. Marlene Strathe at Marlene.Strathe@colostate.edu. If you have any questions about your rights as a volunteer in this research, contact the Colorado School of Mines Human Subjects Research at Humansubjects@mines.edu, 303-384-2589.

Dr. Marlene Strathe
Advisor
Colorado State University
Marlene.Strathe@ColoState.edu

Brent A. Waller
Doctoral Candidate
Colorado State University
Bwaller@mines.edu

APPENDIX C: FOCUS-GROUP INTERVIEW QUESTIONS

[READ DEFINITION OF INTERPERSONAL RELATIONSHIPS TO PARTICIPANTS]

POSSIBLE FOCUS GROUP QUESTIONS:

1. How would you describe your overall interpersonal-relationship experiences with students?
2. Describe the quality of your peer relationships in general and what experiences have contributed to the development of these relationships.
3. What experiences, specifically in the residential environment, have contributed to your peer-relationship development?
4. In what way has being a student played a role in your development of interpersonal relationships with students? (Both positively and negatively.)
5. Tell me about your most meaningful relationship you have had within your residential community
 - a) How do you believe this was contributed to by your residential experience?
6. How would you describe your interpersonal-relationship experiences with students within your residential community?
 - a) Describe the benefits of participation in a Theme Learning Community.
 - b) Looking back, would you still have made the same decision about participating in the Theme Learning Community? Why or why not?
7. Describe how your experience would have been different if your participation status in the residential community had been different. If different, how?
8. What experiences, specifically in the residential environment, have contributed to your peer-relationship development?
9. How would you compare what you observed about interpersonal relationships on campus to what you have observed in the residential learning community?
10. Describe the opportunities you have had to engage in meaningful interactions with other students, staff, or faculty on campus with different beliefs, views, and so on than you have had within your residence hall environment?
11. How would you describe your level of acceptance since being a student in this institution? In what ways?

12. What does it mean to you to be tolerant of others?
13. Provide some of the specific examples that reflect your level of tolerance. What experiences have you had that reflect this level?
14. Do you think students in this institution are developing tolerance for other students who are different from their own cultures, backgrounds, beliefs, and approaches?
15. How confident are you about going into a professional engineering environment that is considered “global,” where you may have daily interactions with some who have different cultures, background, beliefs, and approaches?
16. What could staff and faculty do to enhance interpersonal relationship development among students?

APPENDIX D: APPROVAL LETTERS



Research Integrity & Compliance Review Office
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011 Fort Collins, CO
TEL: (970) 491-1553
FAX: (970) 491-2293

NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE: February 27, 2015
TO: Strathe, Marlene, Education
Waller, Brent, Education, Kamberelis, George
FROM: Swiss, Evelyn, Coordinator, CSU IRB 2
PROTOCOL TITLE: Examining the Mature Interpersonal Relationship Status of First Year Engineering Students Within Residential Learning Communities
FUNDING SOURCE: NONE
PROTOCOL NUMBER: 15-5604H
APPROVAL PERIOD: Approval Date: February 25, 2015 Expiration Date: February 12, 2016

The CSU Institutional Review Board (IRB) for the protection of human subjects has reviewed the protocol entitled: Examining the Mature Interpersonal Relationship Status of First Year Engineering Students Within Residential Learning Communities. The project has been approved for the procedures and subjects described in the protocol. This protocol must be reviewed for renewal on a yearly basis for as long as the research remains active. Should the protocol not be renewed before expiration, all activities must cease until the protocol has been re-reviewed.

If approval did not accompany a proposal when it was submitted to a sponsor, it is the PI's responsibility to provide the sponsor with the approval notice.

This approval is issued under Colorado State University's Federal Wide Assurance 00000647 with the Office for Human Research Protections (OHRP). If you have any questions regarding your obligations under CSU's Assurance, please do not hesitate to contact us.

Please direct any questions about the IRB's actions on this project to:

IRB Office - (970) 491-1553; RICO IRB@mail.Colorstate.edu
Evelyn Swiss, IRB Coordinator - (970) 491-1381; Evelyn.Swiss@Colostate.edu

Evelyn Swiss (handwritten signature)

Swiss, Evelyn

Approval is to recruit up to 988 survey participants and 16 focus group participants with the approved recruitment and consent. SURVEY: Because of the nature of this research, it will not be necessary to obtain a signed consent form. However, all subjects must be consented with the approved electronic cover letter. The requirement of documentation of a consent form is waived under § __,117(c)(2). FOCUS GROUP: The above-referenced project was approved by the Institutional Review Board with the condition that the approved consent form is signed by the subjects and each subject is given a copy of the form. NO changes may be made to this document without first obtaining the approval of the IRB. NOTE: Once the IRB review from the School of Mines is complete, please submit an amendment to include the finalized consent documents (if revisions are requested) and the School of Mines IRB approval.

Approval Period: February 25, 2015 through February 12, 2016
Review Type: EXPEDITED

March 2, 2015

Dr. Marlene Strathe
Colorado State University

Brent Waller
Colorado School of Mines
Residence Life and Housing
Golden, CO 80401

Dear Dr. Strathe and Mr. Waller:

In consultation with the Human Subjects Review Team, I am pleased to grant your request for an Institutional Review Board exemption for the human subjects research you propose to conduct related to the project entitled, "Examining the Mature Interpersonal Relationship Status of First-Year Engineering Students within Residential Learning Communities". The details of your work are described in hard copy and electronic communications in February 2015, and have been retained in our files in the Office of Research Administration.

Your project involves the collection or study of future data. Your exemption is granted under the following provision(s) of 45 C.F.R. 46.101(b):

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (I) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (II) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Please adhere to the measures you cite in your proposal to safeguard the privacy of the subjects and to ensure that no risk is posed to them as a result of participation in your research.

If, during the course of your study, there is a need to make significant changes to the research protocols, you should advise the Human Subjects Team so that we may consider the necessity of amending any part of this exemption approval.

CSM requires project investigators to complete an on-line training course pertaining to research practices involving human subjects. The course must be completed by all investigators, co-investigators and student researchers:

Here are instructions on how to self-enroll in the course:

<http://www.citiprogram.org/citidocuments/ADMIN/Steps%20to%20register%20with%20CITI.ppt>

Here is the actual course:

<http://www.citiprogram.org/>

You should select the module "Social & Behavioral Research - Basic/Refresher, Basic Course". The course takes about 8 hours to complete and it is designed to allow you to access, save, and continue on multiple occasions so that you do not need to take the whole course in one unit. Please print the certification of completion page and provide a copy humansubjects@mines.edu for our files. If you have questions about the website contact the Human Subjects Team for assistance.

Sincerely,



Will Vaughan
Director of the Office of Technology Transfer

cc: File
Anthony Dean, Senior Vice President for Research and Technology Transfer
Esther Henry, Associate Counsel
Johanna Eagan, Office of Research Administration
Department Head
All co-investigators

APPENDIX E: CONSENT TO PARTICIPATE IN A RESEARCH STUDY

TITLE OF STUDY: Examining the Mature Interpersonal Relationship Status of First-Year Engineering Students within Residential Learning Communities

PRINCIPAL INVESTIGATOR: Marlene Strathe, Ph.D., Professor, School of Education, Marlene.Strathe@colostate.edu , 970-227-7970

COPRINCIPAL INVESTIGATOR: Brent A. Waller, School of Education, Doctoral Student, bwaller@miens.edu, 303-273-3046

WHY AM I BEING INVITED TO TAKE PART IN THIS RESEARCH? You are a first year student who is 18 to 24 years old and is currently enrolled in at Colorado School of Mines. You are also currently living in a residence hall community and your perspective is valuable to understand what helps a student develop interpersonal relationships. If you are less than 18 years of age or older than 24 years of age, you will be excluded from this study.

WHO IS DOING THE STUDY? The research team consists of Dr. Marlene Strathe and Brent A. Waller.

WHAT IS THE PURPOSE OF THIS STUDY? The purpose of this study is to investigate the differences in first-year engineering students who elected to live within residential learning communities compared to those that live within a traditional residential environment regarding their mature interpersonal relationship development status.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST? Participation in the focus group will take place at Colorado School of Mines in the Elm Hall Conference Room and will last approximately 60-90 minutes. Follow-up interviews via phone may be necessary to check the accuracy of the findings or to ask further questions. The follow-up interviews should take no more than 5 to 10 minutes.

WHAT WILL I BE ASKED TO DO? You will be asked to share your experiences in the residential learning community as it relates to your interpersonal relationship development.

ARE THERE REASONS WHY I SHOULD NOT TAKE PART IN THIS STUDY? You may be excluded if you are younger than 18 years old, older than 24 years old, or not a first-year student in residence hall environment, or do not agree to be audiotaped in the focus-group setting.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS? By participating in this focus group, there are no known risks. It is not possible to identify all potential risks in research procedures, but the researcher(s) have taken reasonable safeguards to minimize any known and potential, but unknown, risks.

ARE THERE ANY BENEFITS FROM TAKING PART IN THIS STUDY? There are no known benefits to you associated with participation, but the overall anticipated research benefit may help residential learning community engineering programs better understand interpersonal relationship development in engineering. It may also help residential and engineering to design and implement programs, as it relates to interpersonal relationship skills and development.

DO I HAVE TO TAKE PART IN THE STUDY? Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

WHO WILL SEE THE INFORMATION THAT I GIVE? We will keep private all research records that identify you, to the extent allowed by law.

Your information will be combined with information from other people taking part in the study. When we write about the study to share with other researchers, we will write about the combined information we have gathered.

You will not be identified in these written materials. We may publish the results of this study; however, we will keep your name and other identifying information private.

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. For example, your name will be kept separate from your research records and these two things will be stored in different places under lock and key. For example, a pseudonym (John Doe) will be assigned to your information and this record will also be stored in different places under lock and key. We may be asked to share the research files with the Colorado State University Institutional Review Board ethics committee for auditing purposes.

WILL I RECEIVE ANY COMPENSATION

As a thank you, you will receive a \$10 Amazon gift card. Your identity/record of receiving compensation (NOT your data) may be made available to CSU officials for financial audits.

WHAT IF I HAVE QUESTIONS?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions about the study, you can contact the investigator, Brent A. Waller at 303-273-3046. If you have any questions about your rights as a volunteer in this research, contact the Colorado State University IRB at: RICRO_IRB@mail.colostate.edu; 970-491-1553, or the Colorado School of Mines IRB at: 303.384-2589. We will give you a copy of this consent form to take with you.

WHAT ELSE DO I NEED TO KNOW?

You will be audio taped and this information will be stored under lock and key. Only the researchers will have access to the audiotape, and the tape will be destroyed after it has been transcribed. The audio tape will also use a pseudonym to protect your identify and will have no other links back to you in order for your information to remain anonymous.

Do you give permission for the researchers to contact you again to follow-up on comments made in the focus group or to participate in new research projects? Please initial next to your choice below.

- Yes _____ (initials) Email address _____
- No _____ (initials)

Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing 2 pages.

Signature of person agreeing to take part in the study

Date

Printed name of person agreeing to take part in the study

Name of person providing information to participant

Date

Signature of Research Staff

APPENDIX F: MEMBER-CHECK INSTRUCTIONS

Date
Name
Institution

Dear (Name),

As we discussed, attached is a copy of the transcript from our interview on (date). Please review this transcript and contact me if you would like to clarify any of your responses. If I do not hear from you by (date), I will assume that you believe that transcript is an accurate depiction of our conversation. As mentioned in earlier communications, once the study is complete I will forward you a summary of the findings. Again, thank you for your participation, and I appreciate the time you gave me.

Sincerely,

Brent Waller
1795 Elm St.
Golden, CO 80401
Phone: 303-273-3046
Email: bwaller@mines.edu